Pinguely-Haulotte

CE

# REPAIR MANUAL

# SELF-PROPELLED PLATFORM
# STAR 8 - 10P

242 031 9680 - E 06.03 GB

ISO 9001
GROUPE PINGUELY HAULOTTE

ARTICULEES MATS TELESCOPIQUES CISEAUX TRACTEES

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L'ACCES A L'ESPACE

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# GENERAL

This manual gives the information required for you to perform servicing and repair operations on certain pieces of equipment yourself.

However, we would like to bring your attention to the importance of:

- respecting the safety instructions concerning the machine itself, its use and its environment,
- use within the limits of its performance,
- correct servicing to ensure long service life.

During and after the guarantee period, our After-Sales service is available to perform any servicing operations you may require.

In this case, contact our local agency or our Plant After-Sales service, specifying the exact type of machine and its serial number.

To order consumables or spare parts, use the "Instructions for use and maintenace" manual and the "Spare parts" catalogue to order original parts, the only guarantee of interchangability and perfect operation.

REMINDER: We would like to remind you that our machines comply with the clauses of the "Machines Directive", 89/392/CEE, dated June 14th 1989, modified by directives 91/368/CEE, dated June 21st 1991, 93/44/CEE, dated June 14th 1993, 93/68/CEE (98/37/CE) dated July 22nd 1993 and 89/336 CEE, dated May 3rd 1989; to directive 2000/14/CE and directive EMC/89/336/CE.

⚠ Caution!

***The technical data in this manual is not binding and we reserve the right to make improvements or modifications without altering this manual.***

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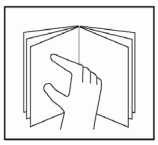
# 1 - GENERAL RECOMMENDATIONS - SAFETY

## 1.1 - GENERAL WARNING



### 1.1.1 - Manual

This manual aims to help maintenance personnel service and repair the machine. It cannot, however, replace the basic training required by any person working on the site equipment.

The site manager must inform operators of the recommendations in the instruction manual. He is also responsible for application of current "user regulations" in the country of use.

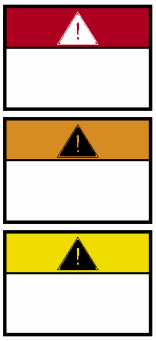
Before operating on the machine, it is essential to be familiar with all the recommendations in this manual and the user manual to ensure personnel and equipment safety.

### 1.1.2 - Labels

Potential dangers and recommendations for the machine are indicated on labels and plates. Read the instructions on them.

All labels conform to the following colour code:

- Red indicates a potentially fatal danger.
- Orange indicates a danger that may cause serious injury.
- Yellow indicates a danger that may cause material damage or slight injury.



Maintenance pesrsonnel must ensure that these labels and plates are in good conditions and keep them legible. Spare labels and plates can be supplied by the manufacturer on request.

### 1.1.3 - Safety

Ensure that any person entrusted with the machine is take the safety measures implied by its use.

Avoid any working mode that may affect safety. Any use that does not comply with the recommendations may generate risks and damage to people and equipment.

*After intervention, maintenance personnel must check that the operator manual is present. This must be kept by the user throughout the machine's service life, even if it is loaned, rented or sold.*

*Ensure that all the plates or labels related to safety and danger are complete and legible.*

***Caution!***
***To attract the reader's attention, instructions are indicated by this standardised sign.***

## 1.2 - GENERAL SAFETY RECOMMENDATIONS

### 1.2.1 - Operators

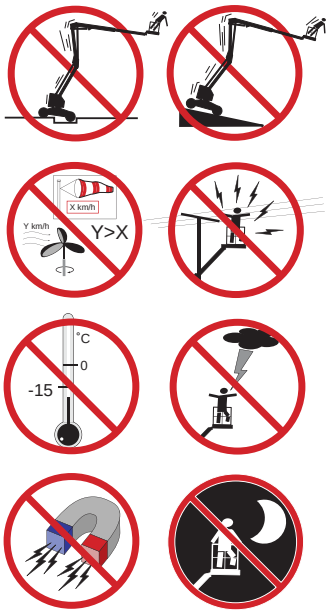
Operators must be aged 18 or over and hold an operating permit issued by the employer after verification of medical aptitude and the practical platform operation test.

***Caution!***
***Only trained operators may use Haulotte self-propelled platforms.***

There must be at least two operators present, so that one of them can:

- intervene rapidly if necessary,
- take over the controls in the case of accident or breakdown,
- monitor and prevent machines or people from circulating around the platform,
- guide the platform operator if necessary.

### 1.2.2 - Environment




Never use the machine:

- On soft, unstable or cluttered floors.
- On a floor with a tilt greater than the allowed limit.
- With a windspeed above the permitted level. In case of outdoor use, check that windspeed is lower or equal to the permitted level using an anemometer.
- Near electric lines (find out about minimum distances according to current). In temperatures of less than -15°C (in particular, in cold rooms); consult our service department if work is required in conditions below -15°C.
- In an explosive atmosphere.
- In an incorrectly ventilated area, as exhaust fumes are toxic.
- During storms (risk of being struck by lightning).
- At night if the machine is not equipped with an optional light.
- In the presence of intense electromagnetic fields (radar, mobile and high current).

**DO NOT DRIVE ON THE PUBLIC HIGHWAY.**

### 1.2.3 - Using the machine

It is important to ensure that in normal use, i.e. platform operation, the platform station selection key remains in the the platform position to enable control of the machine from the platform. If a problem occurs on the platform, a person present and trained in emergency/standby manoeuvres can help by putting the key in the ground control position.

Never use the machine with:

- a load greater than the nominal load,
- more people than the authorised number,
- lateral force in the platform greater than the level permitted,
- wind speed higher than the permitted level.

To avoid all risk of serious fall, operators must respect the following instructions:

- Hold the hand rails firmly when climbing onto or operating the platform.
- Wipe any traces of oil or grease off the steps, floor and hand rails.
- Wear protective clothing suited to working conditions and current local legislation, in particular when working in hazardous areas.
- Do not disable the safety system end of stroke contactors.
- Avoid contact with fixed or mobile obstacles.
- Do not increase working height by using ladders or other accessories.
- Never use the hand rails as a means of access for getting onto and off the platform (use the steps provided on the machine).
- Never climb on the hand rails when the platform is raised.
- Never drive the platform at high speed in narrow or cluttered areas.
- Never use the machine without installing the platform protective bar or closing the safety barrier.
- Never climb on the covers.

***Caution!***
***Never use the platform as a crane, goods lift or elevator. Never use the platform or tow or haul.***

To avoid risks of tipping over, operators must respect the following instructions:

- Do not disable the safety system end of stroke contactors.
- Avoid moving the steering control levers in the opposite direction, without stopping in the "O" position (to stop during a travel manoeuvre, move the manipulator lever gradually).
- Respect maximum load and maximum number of people authorised on the platform.
- Distribute the load evenly and place in the centre of the platform if possible.
- Check that the floor resists the pressure and load per wheel.
- Avoid contact with fixed or mobile obstacles.
- Do not drive the platform at high speed in narrow or cluttered areas.
- Do not drive the platform in reverse (inadequate visibility).
- Do not use the machine if the platform is cluttered.
- Do not use the machine with equipment or objects hanging from the hand rails.
- Do not use the machine with elements that may increase the wind load (e.g. panels).
- Do not perform machine maintenance operations when the machine is raised without setting up the required safety means (gantry crane, crane).
- Make daily checks and monitor proper operation during periods of use.
- Preserve the machine from any uncontrolled operation when it is not in service.

*NB:* *Do not tow the platform (it is not designed to be towed and must be transported on a trailer).*

## 1.3 - RESIDUAL RISKS

### 1.3.1 - Risks of jerky movements and tipping over

***Caution!***

***The direction of travel can be reversed after a 180° turntable rotation. Take account of the colour of the arrows on the chassis compared with the direction of travel (green = forward, red = reverse) Thus, moving the manipulator in the direction of the green arrow on the control panel will move the machine according to the direction indicated by the green arrow on the chassis. Similarly, moving a manipulator in the direction of the red arrow on the control panel, will move the machine in the direction of the red arrow on the chassis***

Risks of jerky movement and tipping over are high in the following situations:

- Sudden action on the controls.
- Overloading of the platform.
- Uneven ground (Be careful during thaw periods in winter).
- Gusts of wind.
- Contact with an obstacle on the ground or at a height.
- Working on platforms, pavements, etc.

Allow sufficient stopping distances:

- 3 meters at high speed,
- 1 meter at low speed.

Allow sufficient stopping distances: 3 metres at high speed and 1 metre at low speed.

Do not alter or neutralise any components connected in any way to the machine's safety or stability.

Do not place or fasten a load so that it overhangs the machine's parts.

Do not touch adjacent structures with the elevator arm.

### 1.3.2 - Electrical risk

***Caution!***

***If the machine has a 220 V 16A max. plug, the extension must be connected to a mains socket protected by a 30 mA differential circuit breaker.***

Electrical risks are high in the following situations:

- Contact with a live line (check safety distances before operation near electricity lines).
- Use during storms.

### 1.3.3 - Risk of explosion or burning

The risks of explosion or burning are high in the following situations:

- Working in explosive or inflammable atmosphere.
- Filling the fuel tank near naked flames.
- Contact with the hot parts of the motor.
- Use of a machine generating hydraulic leakage.

### 1.3.4 - Risks of collision

- Risk of crushing people in the machine operation zone (when travelling or manoeuvring equipment).
- The operator must assess the risks above him before using the machine.
- Pay attention to the position of the arms during turntable rotation.
- Adapt movement speed to conditions related to the ground, traffic, slope and movement of people, or any other factor that may cause a collision.
- When driving down the ramp of a truck, ensure sufficient space is available for safe unloading.
- Check brake pad wear regularly to avoid all risk of collision.

## 1.4 - INSPECTIONS

Comply with the national regulations in force in the country of machine use.

For FRANCE: Order dated 9 June 1993 + circular DRT 93 dated 22 September 1993 which specify:

### 1.4.1 - Periodic inspections

The machine must be inspected every 6 months in order to detect any defects liable to cause an accident.

These inspections are performed by an organisation or personnel specially designated by the site manager and under his responsibility (whether or not they belong to the company) Articles R 233-5 and R 233-11 of the French Labour Code.

The results of these inspections are recorded in a safety register kept by the site manager and constantly available to the labour inspector and the site safety committee (if one exists) and the list of specially designated personnel (Article R 233-5 of the French Labour Code).

Moreover, before each use, check the following:

- the operator's manual is in the storage compartment on the platform,
- the stickers are placed according to the section concerning "Labels and their positions",
- oil level and any elements in the mainteance operation table
- look out for any danaged, incorrectly installed, modified or missing parts.

*NOTE : This register can be obtained from trade organisations, and in some cases from the OPPBTP or private prevention agencies.*

The designated persons must be experienced in risk prevention (Articles R 233-11 or order n° 93-41).

No member of personnel is allowed to perform any check whatsoever during machine operation (Article R 233-11 of the French Labour Code).

### 1.4.2 - Examination of machine suitability

The manager of the site where the machine is operated must ensure the machine is suitable, i.e. capable of performing the work in complete safety, and in compliance with the operating manual. Furthermore, the French order of 9 June 1993 addresses problems relative to leasing, examination of the state of conservation, checking upon operation after repairs, and test conditions (static test coefficient 1.25; dynamic test coefficient 1.1). All users must consult this order's requirements and comply with them.

### 1.4.3 - State of conservation

Detect any deterioration liable to cause hazardous situations (concerning safety devices, load limiters, tilt sensor, cylinder leaks, deformation, welds, bolt tightness, hoses, electrical connections, tyre state, excessive mechanical gaps).

*NOTE : If the machine is rented/leased, the user responsible for the machine must examine its state of conservation and suitability. He must obtain assurance from the leaser that general periodic inspections and pre-operation inspections have been performed.*

## 1.5 - REPAIRS AND ADJUSTMENTS

These cover major repairs, and work on or adjustments to safety systems or devices (of a mechanical, hydraulic or electrical nature).

These must be performed by personnel from or working for PINGUELY-HAULOTTE who will use only original parts.

Any modification not controlled by PINGUELY-HAULOTTE is unauthorised.

The manufacturer cannot be held responsible if non-original parts are used or if the work specified above is not performed by PINGUELY-HAULOTTE-approved personnel.

## 1.6 - VERIFICATIONS WHEN RETURNING TO SERVICE

To be performed after:

- extensive disassembly-reassembly operation,
- repair affecting the essential components of the machine,
- any accident caused by the failure of an essential component.

It is necessary to perform a suitability examination, a state of conservation examination, a static test, a dynamic test (see coefficient in paragraph (see Chap 1.4.2, page 9).

***Caution!***
***These test must be performed by a competent person.***

## 1.7 - BEAUFORT SCALE

The Beaufort Scale of wind force is accepted internationally and is used when communicating weather conditions. It consists of number 0 - 17, each representing a certain strength or velocity of wind at 10m (33 ft) above ground level in the open.

| Description of Wind | | Specifications for use on land | MPH | m/s |
|---|---|---|---|---|
| 0 | Calm | Calm; smoke rises vertically | 0-1 | 0-0.2 |
| 1 | Light Air | Direction of wind shown by smoke | 1-5 | 0.3-1.5 |
| 2 | Light Breeze | Wind felt on face; leaves rustle; ordinary vanes moved by wind | 6-11 | 1.6-3.3 |
| 3 | Gentle Breeze | Leaves and small twigs in constant motion; wind extends light flag | 12-19 | 3.4-5.4 |
| 4 | Moderate Breeze | Raises dust and loose paper; small Branches are moved | 20-28 | 5.5-7.9 |
| 5 | Fresh Breeze | Small trees in leaf begin to sway; crested wavelets form on inland waterways | 29-38 | 8.0-10.7 |
| 6 | Strong Breeze | Large branches in motion; whistling heard in telephone wires; umbrellas used with difficulty | 39-49 | 10.8-13.8 |
| 7 | Near Gale | Whole trees in motion; inconvenience felt when walking against wind | 50-61 | 13.9-17.1 |
| 8 | Gale | Breaks twigs off trees; generally impedes progress | 62-74 | 17.2-20.7 |
| 9 | Strong Gale | Slight structural damage occurs (chimney pots and slates removed) | 75-88 | 20.8-24.4 |

# 2 - SPECIFICATIONS

Self-propelled platforms, models STAR 22J are designed for all overhead work within the limits of their characteristics (see corresponding chapter) and in compliance with the safety instructions specific to the equipment and places of use.

The main operation station is in the platform.

The operation station on the turntable is an emergency or standby station.

## 2.1 - TECHNICAL CHARACTERISTICS

### 2.1.1 - STAR 22J technical characteristics:

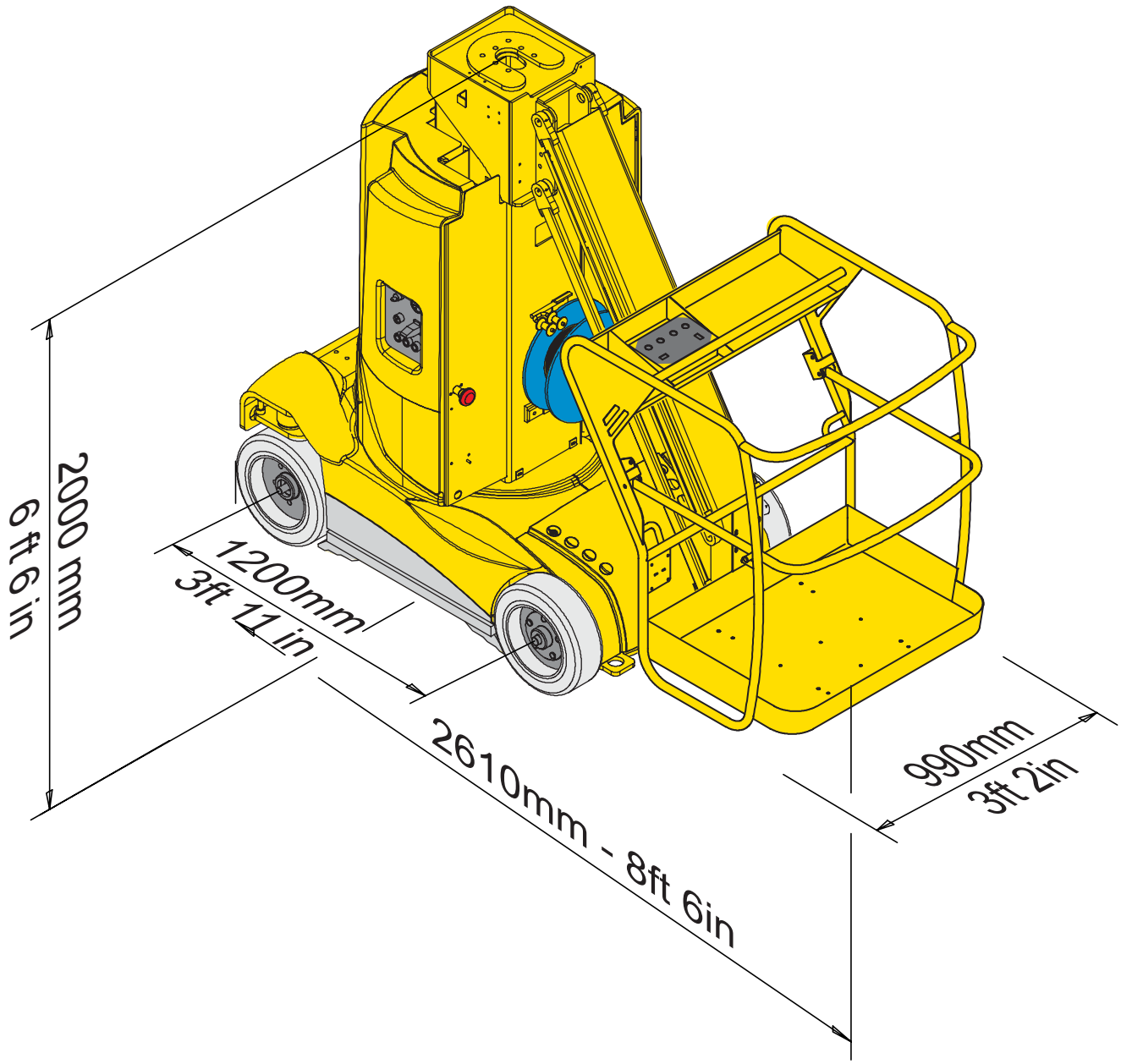
| | STAR 22J |
|---|---|
| Useful load (interior / exterior) | 440 lb -2 pers. / 352 lb - 1 pers. |
| Maximum lateral force (interior / exterior) | 88 lb / 44 lb |
| Working height | 28 ft 7 in |
| Floor height | 22 ft |
| Maximum range | 8 ft 6 in |
| Turntable rotation | 360° not continuous |
| Max. working slope and tilt | 3° (approx. 5.2%) |
| Platform floor dimensions | 2 ft 2 in x 3 ft |
| Maximum slope in travel | 25% |
| Low travel speed | 0.43 mph |
| High travel speed | 2.79 mph |
| Traction batteries | 24V - in 2 trays |
| Floor clearance (under pothole system) | $3^{3/4}$in mm max. - ($1^{1/2}$ in) |
| Tyres | Solid tires |
| Turning radius:<br>* interior<br>* exterior | <br>1 ft 5 in<br>6 ft 1 in |
| Mast telescoping travel | 12 ft 1 in |
| Maximum wind speed in operation (inside / outside) | 0 mph / 27.96 mph |
| Max. pressure on the floor with a 440 lb load: concrete | 206 pound/inch² |
| Max. force on one wheel | 5467 lbf |
| Movement time with 1 person:<br>* Turntable orientation (approx. 360°)<br>* Mast telescoping: out / in (approx.)<br>* Jib lifting: up / down (approx.) | <br>60 s<br>40 s / 27 s<br>26 s / 36 s |
| Motor·<br>* Voltage<br>* Power<br>* Consumption | separate energizing<br>24V<br>1.2 kW<br>63A |
| Hydraulic operation pump: capacity | 0.06 + 0.33 $inch^3$/ rev |
| Sound level: | < 75 db |
| Vibrations at foot level | < 1 ft 7 in/s² |
| Vibrations at hand level | > 1 ft 7 in /s² |
| Hydraulic oil tank capacity | 6.6 gallons |
| Operating hydraulic pressure:<br>* max. steering pressure<br>* max. rotation pressure<br>* max. mast out telescoping pressure<br>* max. jib lifting pressure | <br>2320 psi<br>725 psi<br>652 psi<br>2320 psi |
| Tightening torque for steering wheel nuts | 213 ft-lb |

| | STAR 22J |
|---|---|
| Tightening torque for drive wheel nuts | 213 ft-lb |
| Tightening torque for slew ring screws | 99 ft-lb |
| Weight | 390 stones |
| Dimensions | (Figure: Size, page 13, ) |

- All pressure values can be checked using a pressure inlet.
  - 2 drive wheels with brake reducing gears and electric motors controlled by choppers.
  - Jib, lifting, telescoping, turning movements, hydraulic electropump and speed controlled by choppers.
  - Steering by electro-distributor.

### 2.1.2 - Size of the STAR 22 J mast

Fig. 1 - Size



## 2.2 - TIGHTENING TORQUE VALUES

### 2.2.1 - Tightening torque values for large thread screws

| Nominal diameter | Tightening torque in ft.lb | | |
|---|---|---|---|
| | 8.8 | 10.9 | 12.9 |
| M 6*1 | 6.63 to 8.11 | 9.6 to 10.3 | 11.6 to 12.5 |
| M 7*1 | 11.06 to 14 | 15.5 to 17.7 | 19.2 to 20.6 |
| M 8*1.25 | 16.2 to 19.9 | 22.9 to 25.1 | 27.3 to 30.2 |
| M 10*1.5 | 31.7 to 33.1 | 45 to 49.4 | 53.9 to 59.7 |
| M 12*1.75 | 55.3 to 69.3 | 81.1 to 88.5 | 95.9 to 103.2 |
| M 14*2 | 88.5 to 110.6 | 125.4 to 140 | 147.5 to 162.2 |
| M 16*2 | 140.1 to 169.6 | 191.8 to 213.8 | 236 to 258 |
| M 18*2.5 | 191.7 to 236 | 265.5 to 295 | 324.5 to 354 |
| M 20*2.5 | 272.9 to 331.9 | 383.6 to 420.4 | 457.3 to 501.5 |
| M 22*2.5 | 368.8 to 457.2 | 516.3 to 567.9 | 619.6 to 685.9 |
| M 24.3*3 | 464.7 to 582.6 | 656.4 to 730.1 | 789.2 to 870.3 |
| M 27*3 | 685.9 to 848.1 | 958.8 to 1032.5 | 1150.6 to 1275.9 |
| M 30*3.5 | 929.3 to 1157.9 | 1305.5 to 1445.6 | 1622.7 to 1733.2 |

### 2.2.2 - Tightening torque values for small thread screws

| Nominal diameter | Tightening torque in ft.lb | | |
|---|---|---|---|
| | 8.8 | 10.9 | 12.9 |
| M 8*1 | 17.7 to 21.3 | 24.4 to 27.3 | 29.5 to 44 |
| M 10*1.25 | 33.9 to 42 | 47.2 to 52.3 | 56.8 to 85 |
| M 12*1.25 | 66.2 to 73.7 | 85.8 to 95.9 | 103.2 to 150 |
| M 14*1.5 | 95.9 to 118 | 132.7 to 147.5 | 162.2 to 240 |
| M 16*1.5 | 147.5 to 184.3 | 206.5 to 228.6 | 340 to 370 |
| M 18*1.5 | 213.8 to 265.5 | 302.4 to 331.9 | 490 to 540 |
| M 20*1.5 | 302.4410 to 376 | 420.4 to 464.6 | 690 to 760 |
| M 22*1.5 | 405.7 to 501.5 | 575.3 to 641.6 | 920 to 1000 |
| M 24*1.5 | 508.9 to 634.3 | 715.4 to 789.2 | 1160 to 1290 |
| M 27*2 | 737.6 to 958.8 | 1032.5 to 1150.6 | 1690 to 1880 |
| M 30*2 | 1032.5 to 1253.8 | 1445.6 to 1607.8 | 2350 to 2610 |

### 2.2.3 - Tightening torque values for hydraulic hoses

| Description - Drawing no. A14706 | Torque applied (ft.lb) min - max |
|---|---|
| Ref. 7 - Hose SP 5238 - Lg 2060 | 7.37-11.06 |
| Ref. 8 - Hose SP 5008 - Lg 530 | 7.37-11.06 |
| Ref. 9 - Hose SP 5238 - Lg 1640 | 7.37-11.06 |
| Ref. 10 - Hose SP 2361 - Lg 1450 | 44.25-59 |
| Ref. 11 - Hose SP 449 - Lg 670 | 59-73.75 |
| Ref. 12 - Hose SP 5025 - Lg 400 | 59-73.75 |

| *Description - Drawing no. A14706* | *Torque applied (ft.lb) min - max* |
|---|---|
| **Ref. 13 - Hose SP 5008 - Lg 1300** | 7.37-11.06 |
| **Ref. 14 - Hose SP 5008 - Lg 550** | 7.37-11.06 |
| **Ref. 47 - Hose SP 5028 - Lg 500** | 44.25-59 |
| **Ref. 53 - Hose SP 2361 - Lg 700** | 44.25-59 |
| **Ref. 54 - Hose SP 1663 - Lg 610** | 29.5-36.87 |
| **Ref. 68 - Hose SP 1786 - Lg 500** | 18.44-25.81 |
| **Ref. 69 - Hose SP 1756 - Lg 350** | 1844-25.81 |

### 2.2.4 - Pressure table (in psi)

| Main | Steering | Rotation | Lifting |
|---|---|---|---|
| 2320 | 2320 | 725 | 652 |

### 2.2.5 - Table of adjustment times

| *Movement* | *Movement duration* |
|---|---|
| Microspeed - Mast up | 50 s +/- 2s for 32 ft 9 in |
| High speed forward - Mast and jib down | 8 s +/- 1s for 32 ft 9 in |
| High speed reverse - Mast and jib down | 8 s +/- 1s for 32 ft 9 in |
| Braking distance - High speed - Mast and jib down | 70cm +/- 7 in |
| Ring rotation from right to left - Mast and jib down | 60s +/- 2s |
| Right to left steering - Mast and jib down | 4s +/- 1s |
| Mast up with nominal load in the basket - STAR 22 J | 42s |
| Jib up with nominal load in the basket | 26s +2s / -3s |

# 3 - SAFETY SYSTEMS

## 3.1 - MACHINE ELEMENTS

### 3.1.1 - Motors

| | |
|---|---|
| M1 | electropump |
| MD | right traction motor |
| MG | left traction motor |
| EFG | left electrobrake |
| EG | left energizing |
| EFD | right electrobrake |
| ED | right energizing |

### 3.1.2 - Power supplies and fuses

| | | |
|---|---|---|
| FU1 | 1A | overload protection (being phased out) |
| FU2 | 10A | control protection |
| FU3 | 10A | electrovalve protection |
| FU4 | 250A | power protection |
| FU5 | 5A | working light |

### 3.1.3 - Inputs

#### *3.1.3.1 - Control inputs*

| | |
|---|---|
| SB1 | emergency stop, line contactor |
| SA1 | turntable / platform station selection |
| SA2 | platform panel movement selection |
| SB3 | platform emergency stop |
| SB5 | turntable jib control |
| SB6 | turntable mast control |
| SB7 | turntable rotation control |
| SB8 | platform movement validation button |
| SB9 | platform buzzer |
| SM1 | turntable manipulator |
| SM2 | platform rotation / steering manipulator |
| SM3 | platform travel / mast / jib manipulator |

Brake release control (option)

#### *3.1.3.2 -Safety system inputs*

| | |
|---|---|
| SQ1 | tilt |
| SQ4 | mast bottom end of travel |
| SQ10 | mast top end of travel |
| SQ12 | jib > 0° |
| B1 | weighing pressure sensor |
| P1 | steering potentiometer |
| P2 | weighing angle sensor |
| RL2 | isolation relay |

### 3.1.4 - Outputs

*3.1.4.1 - Relays*

| | |
|---|---|
| RL1 | overload relay |
| RL2 | isolation relay |
| RCH | internal charger relay |

*3.1.4.2 - On/off electrovalves*

| | |
|---|---|
| YV1a | right steering |
| YV1b | left steering |
| YV2a | left rotation |
| YV2b | right rotation |
| YV3a | jib up or mast down |
| YV3b | mast up |
| YV4 | mast up |
| YV5 | jib down or jib up |
| YV6 | mast down |

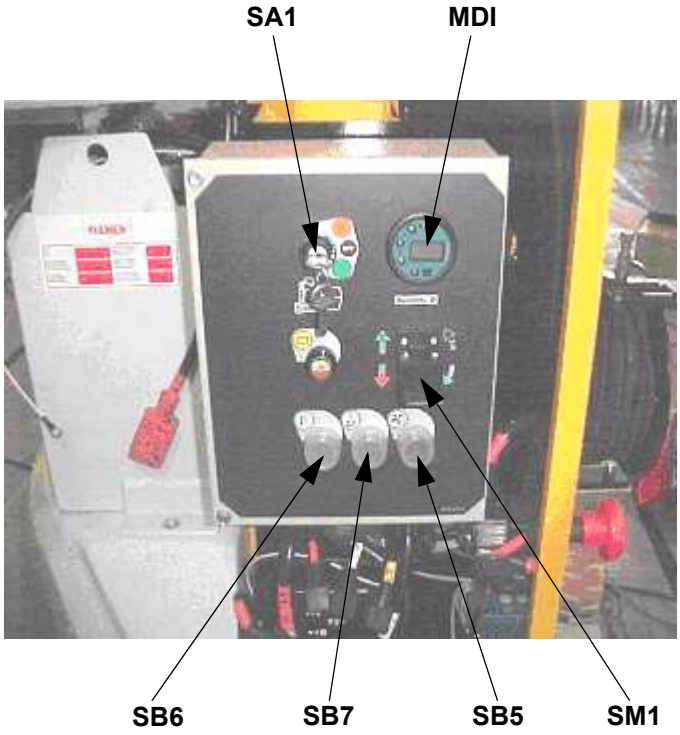
*3.1.4.3 - Buzzers*

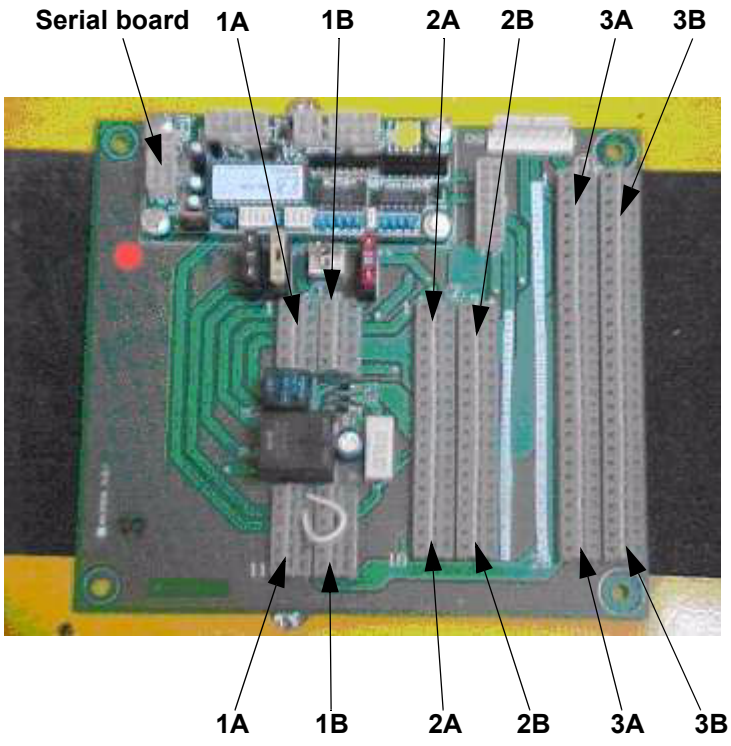
| | |
|---|---|
| H1 | platform horn |

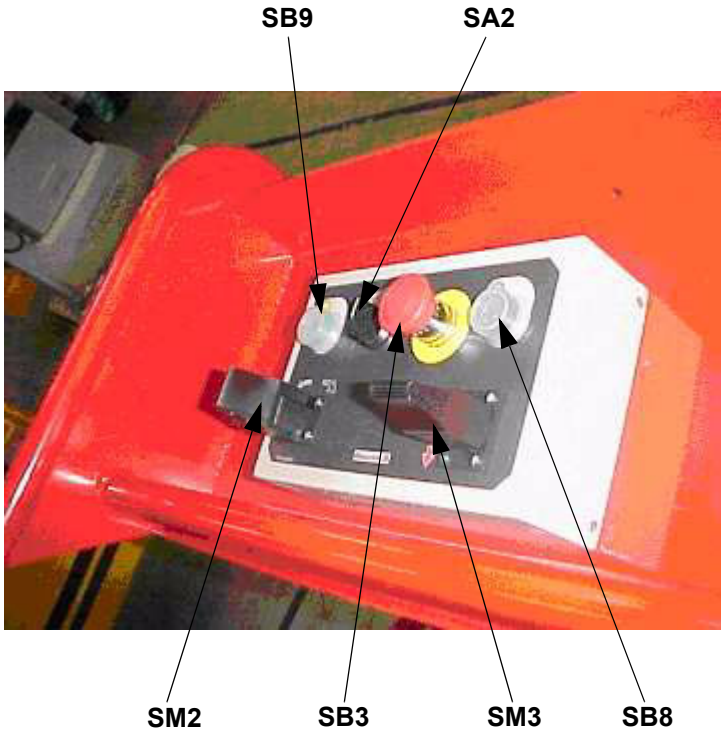
*3.1.4.4 -Light indicators*

| | |
|---|---|
| PV | hour meter, battery indicator |
| HA | weighing or tilt alarm light indicator |
| HPh | working light |

# 4 - POSITIONS OF ELECTRIC COMPONENTS

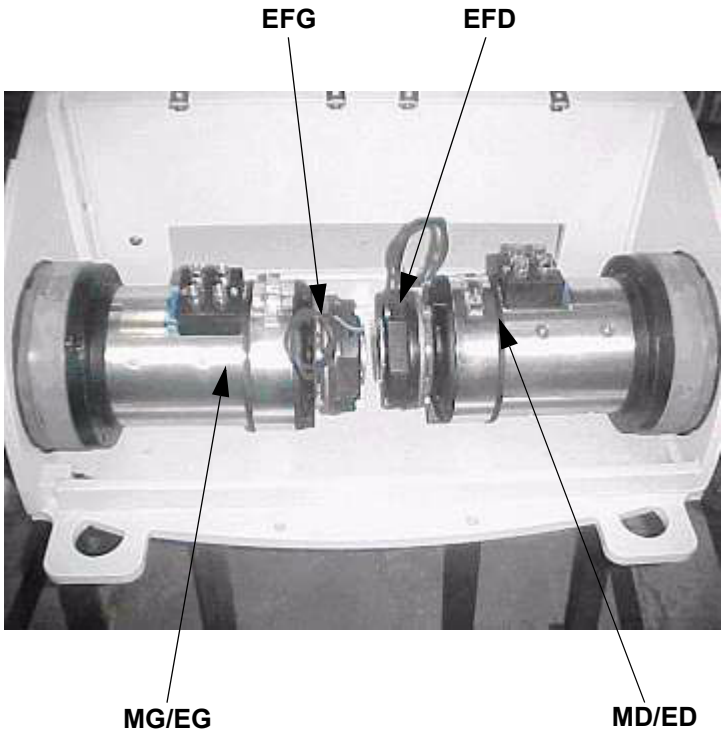





## 4.1 - CHASSIS EQUIPMENT

| | |
|---|---|
| MD | Right side travel motor |
| MG | Left side travel motor |
| EDF | Right travel motor electrobrake |
| EFG | Left travel electrobrake |
| EG | Left side travel motor inducer |
| ED | Right side travel motor inducer |
| P1 | Steering potentiometer |



# 5 - OPERATING EQUATIONS

## 5.1 - START-UP

If SB1=1 and RCH=0 and (SA1=turntable or (SA1=platform and SB3=1)) then chopper active

## 5.2 - SHUTDOWN

If SB1=0 or RCH=1 or (SA1=0 or (SA1=platform and SB3=0)) then chopper inactive

## 5.3 - MAST LIFTING

### 5.3.1 - Turntable

*5.3.1.1 - Up*

If SA1=turntable and SB6=1 and SM1=1 and (SQ1=1 or machine retracted) and overload =0 then YV3b=1 and YV4=1 and M1=1

overload =1 if inputs 26=0 and 38=0 (26 and 38 ZAPI chopper inputs - 26: jib up blocking - 38: jib down blocking)

Machine retracted -> SQ4=1 and SQ12=1

*5.3.1.2 -Down*

If SA1=turntable and SB6=1 and SM1=1 and overload =0 then YV3a=1 and YV6=1 and M1=1

overload =1 if inputs 26=0 and 38=0.

Machine retracted -> SQ4=1 and SQ12=1

### 5.3.2 - Platform

*5.3.2.1 -Up*

If SA1=platform and SB3=1 and SB8=1 and SA2=Mast and SM3=1 and (SQ1=1 or machine retracted and overload = 0 then YV3b = 1 and YV4=1 and M1=1

overload =1 if inputs 26=0 and 38=0

Machine retracted -> SQ4=1 and SQ12=1

*5.3.2.2 -Down*

Overload =0 then YV3a=1 and YV6=1 and M1=1

Overload =1 if inputs 26=0 and 38=0

Machine retracted -> SQ4=1 and SQ12=1

## 5.4 - JIB

### 5.4.1 - Turntable

*5.4.1.1 -Up*

If SA1=turntable and SB5=1 and SM1=1 and (SQ1=1 or machine retracted) and overload =0 then YV3a=1 and YV5=1 and M1=1

Overload=1 if inputs 26=0 and 38=0.

Machine retracted -> SQ4=1 and SQ12=1

*5.4.1.2 -Down*

If SA1= turntable and SB5=1 and SM1=1 and overload=0 then YV5=1

overload=1 if inputs 26=0 and 38=0.

Machine retracted -> SQ4=1 and SQ12=1

### 5.4.2 - Platform

*5.4.2.1 -Up*

If SA1=platform and SB8=1 and SA2=jib and SM3=1 and (SQ1=1 or machine retracted) and overload=0 then YV3a=1 and YV5=1 and M1=1

overload=1 if inputs 26=0 and 38=0

Machine retracted -> SQ4=1 and SQ12=1

*5.4.2.2 -Down*

If SA1=turntable and SB8=1 and SA2=jib and SM3=1 and overload=0 then YV5=1

overload=1 if inputs 26=0 and 38=0

Machine retracted -> SQ4=1 and SQ12=1

## 5.5 - ROTATION

### 5.5.1 - Turntable

*5.5.1.1 -Left*

If SA1=turntable and SB7=1 and SM1=1 and (SQ1=1 or machine retracted) and overload=0 then YV2a=1 and M1=1

overload=1 if inputs 26=0 and 38=0

Machine retracted -> SQ4=1 and SQ12=1

*5.5.1.2 -Right*

If SA1=turntable and SB5=1 and SM1=1 and (SQ1=1 or machine retracted) and overload=0 then YV2b=1 and M1=1

overload=1 if inputs 26=0 and 38=0.

Machine retracted -> SQ4=1 and SQ12=1

### 5.5.2 - Platform

*5.5.2.1 -Left*

If SA1=platform and SB8=1 and SA2=rotation andSM2=1 and (SQ1=1 or machine retracted) and overload=0 then YV2a=1 and M1=1

overload=1 if inputs 26=0 and 38=0

Machine retracted -> SQ4=1 and SQ12=1

*5.5.2.2 -Right*

If SA1=turntable and SB8=1 and SA2=rotation and SM2=1 and (SQ1=1 or machine retracted) and overload=0 then YV2b=1 and M1=1

overload=1 if inputs 26=0 and 38=0.

Machine retracted-> SQ4=1 and SQ12=1

## 5.6 - TRAVEL

### 5.6.1 - Platform

If SQ4=0 or SQ12=0 then Microspeed = 1

*5.6.1.1 -Forward*

If SA1=platform and SB8=1 and SA2=travel and SM3=1 and (SQ1=1 or machine retracted) and overload=0 then MD=1 and MG=1: full setpoint

overload=1 if inputs 26=0 and 38=0.

Machine retracted -> SQ4=1 and SQ12=1

*5.6.1.2 -Reverse*

If SA1=turntable and SB8=1 and SA2=travel and SM3=1 and (SQ1=1 or machine retracted) and overload=0 then MD=1 and MG=1: full setpoint

overload=1 if inputs 26=0 and 38=0.

(*option not available at present)

Machine retracted -> SQ4=1 and SQ12=1

## 5.7 - STEERING

### 5.7.1 - Platform

*5.7.1.1 -Left*

If SA1=platform and SB8=1 and SA2=travel and SM2=1 and (SQ1=1 or machine retracted) and overload=0 then M1=1 and YV1b=1

overload=1 if inputs 26=0 and 38=0.

Machine retracted -> SQ4=1 and SQ12=1

*5.7.1.2 -Right*

If SA1=turntable and SB8=1 and SA2=travel and SM2=1 and (SQ1=1 or machine retracted) and overload=0 then M1=1 and YV1a=1

overload=1 if inputs 26=0 and 38=0.

Machine retracted -> SQ4=1 and SQ12=1

## 5.8 - HORN

If SA1=platform and SB9=1 then H1=1

## 5.9 - BUZZER

### 5.9.1 - Without option

If (SQ1=0 and machine extended) or overload=1 then buzzer=1

### 5.9.2 - With option on console

If (travel_option=1 and Travel=1) or (movement_option=1 and (mast=1 or jib=1 or rotation=1) then buzzer=1

## 5.10 - WORKING LIGHT OPTION LIGHT INDICATOR

The working light is electrically wired. To use it, activate the switch.

## 5.11 - WEIGHING OR TILT ALARM LIGHT INDICATOR

If overload=1 or (SQ1=0 and machine extended) then HA=1

(*option not available at present)

## 5.12 - HOUR METER AND BATTERY CHARGE LIGHT INDICATOR

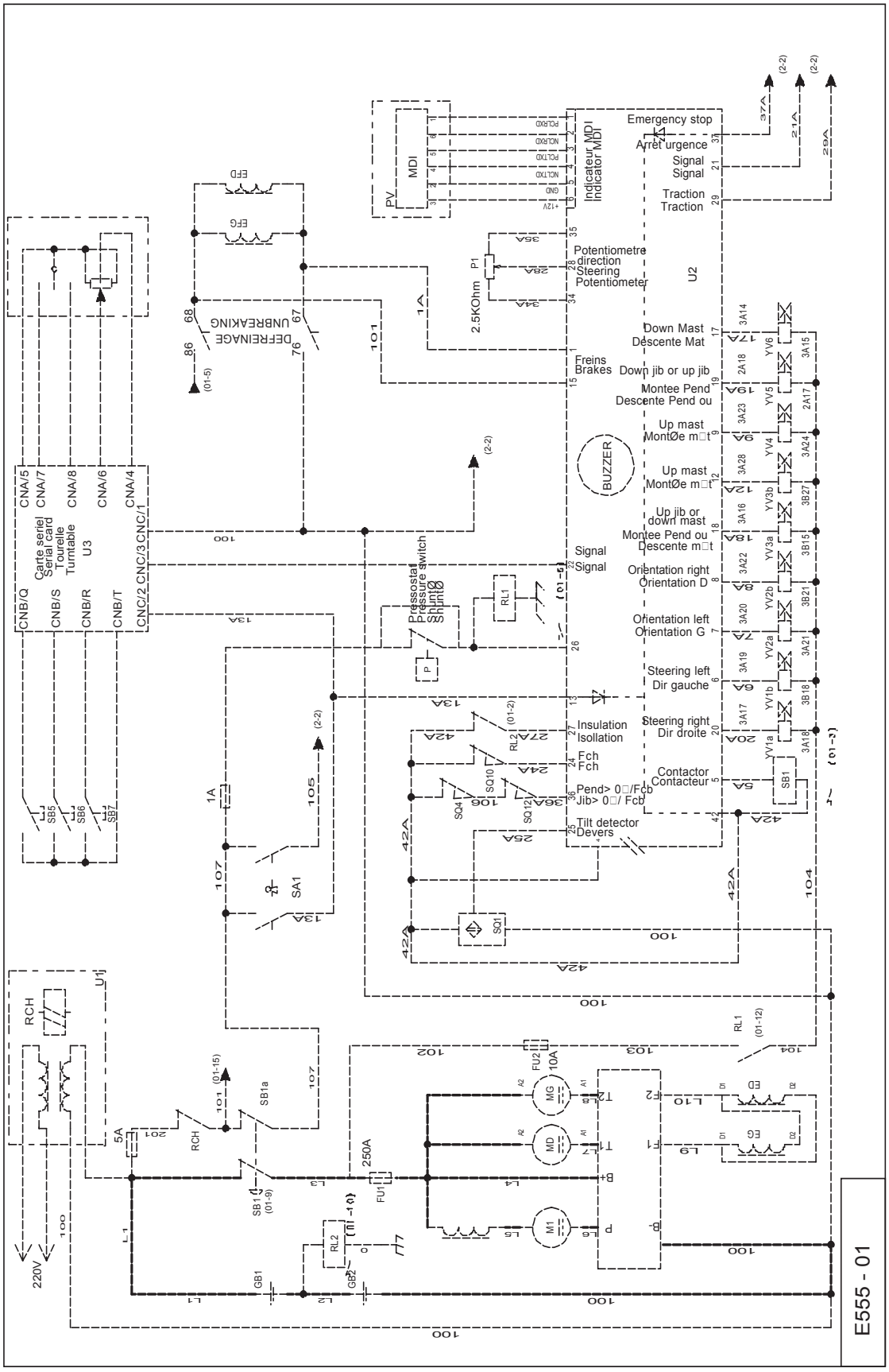
Shows the number of hours of use for the machine and remaining battery charge.

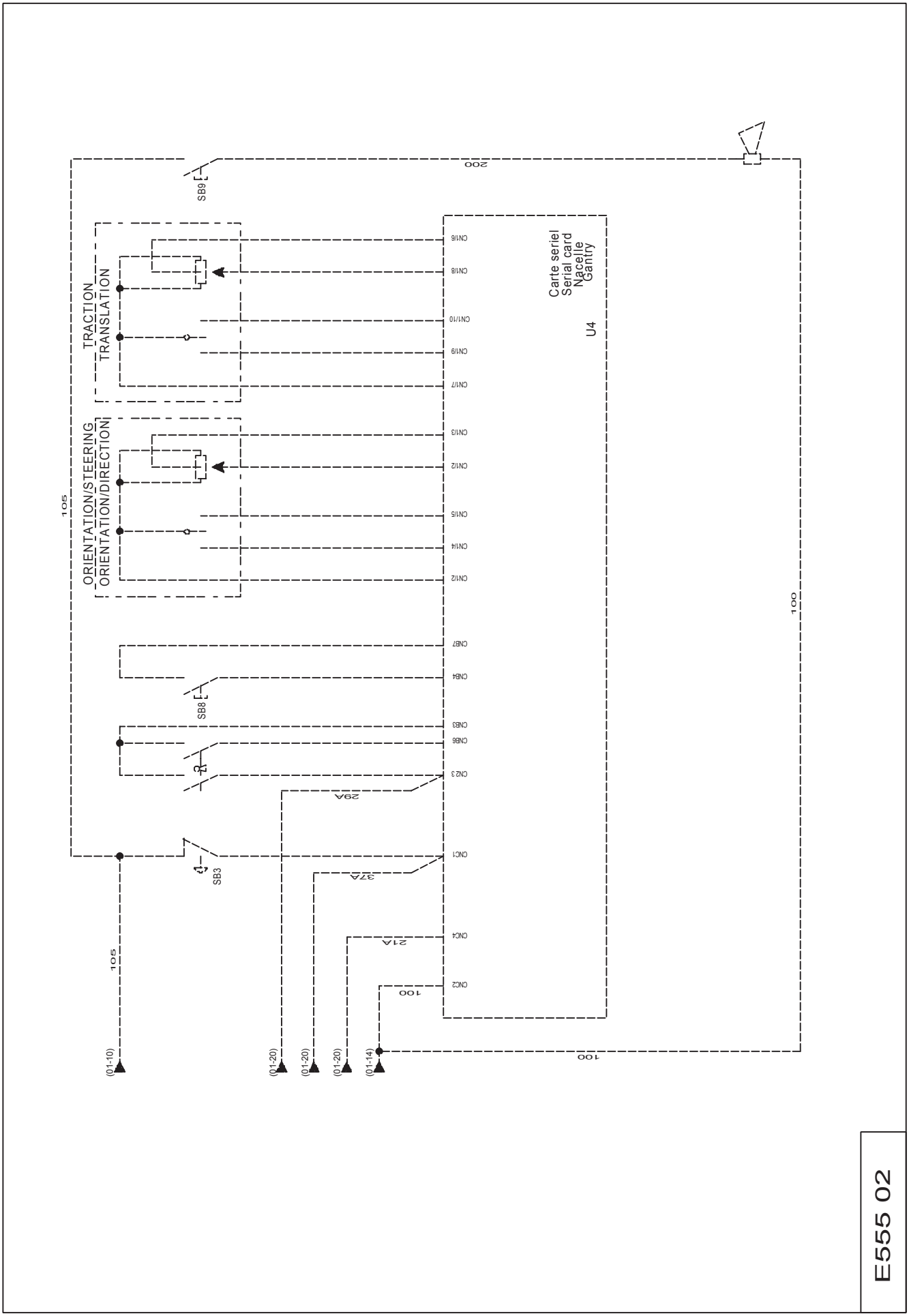
## 5.13 - OTHER FUNCTIONS

### 5.13.1 -Platform movement validation button:

Pressing the button validates platform movements for 5 seconds. This duration is renewed as soon as a movement is made.

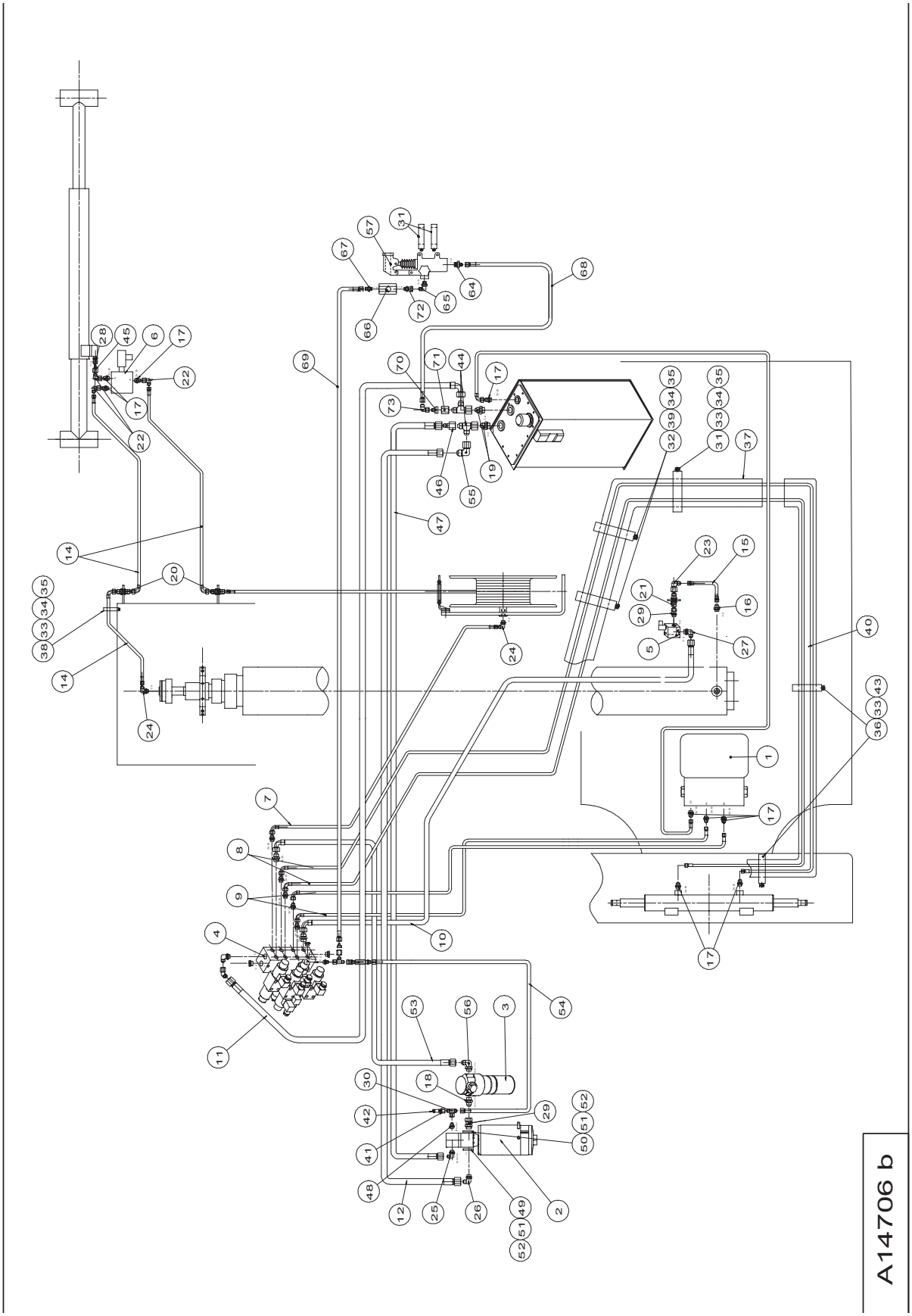
# 6 - WIRING DIAGRAMS

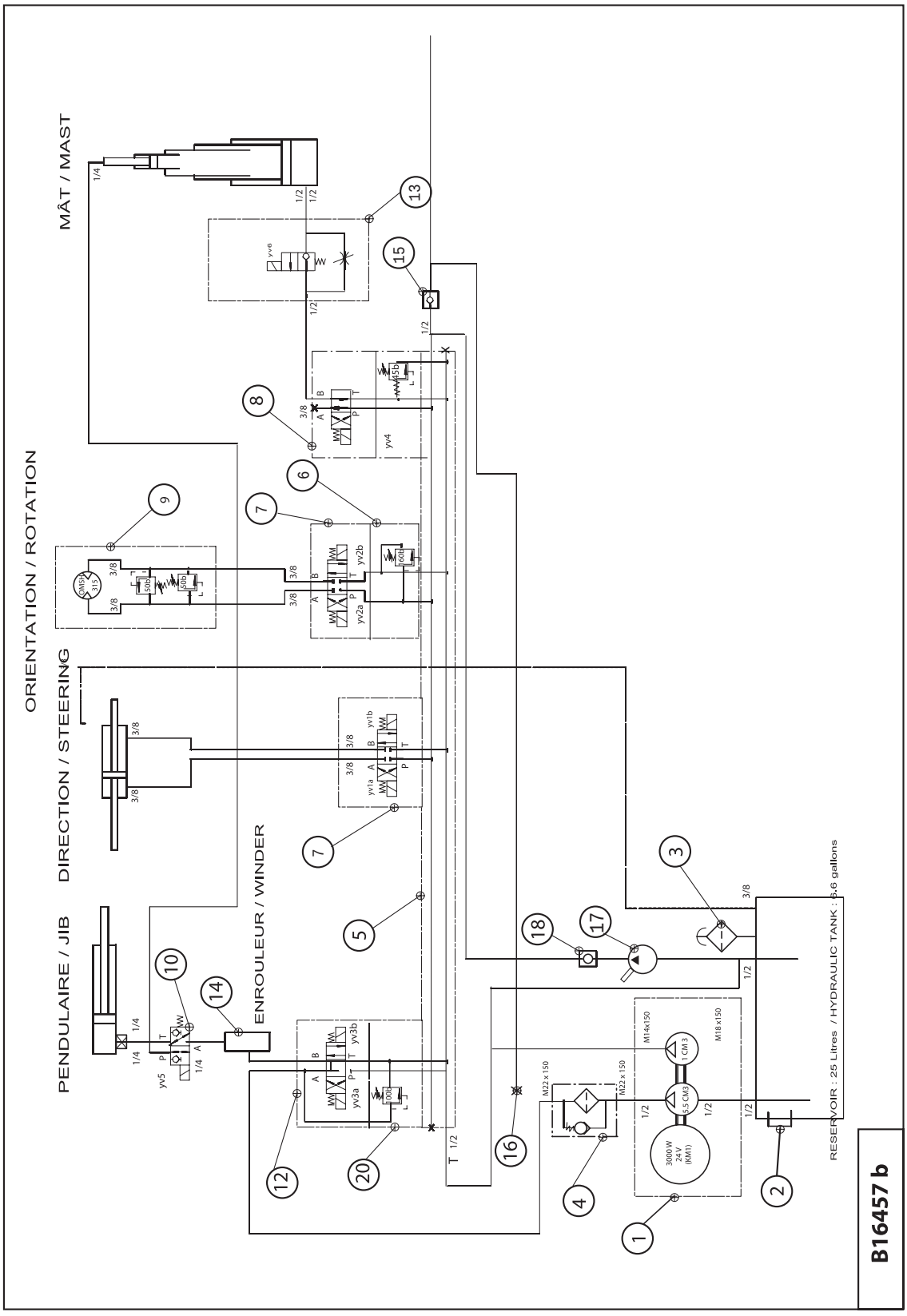



200
SB9
TRACTION
TRANSLATION
ORIENTATION/STEERING
ORIENTATION/DIRECTION
105
Carte seriel
Serial card
Nacelle
Gantry
U4
CN1/6
CN1/8
CN1/10
CN1/9
CN1/7
CN1/3
CN1/2
CN1/5
CN1/4
CN1/2
CNB7
CNB4
CNB3
CNB6
CNZ3
CNC1
CNC4
CNC2
SB8
SB3
29A
37A
21A
100
105
100
(01-10)
(01-20)
(01-20)
(01-20)
(01-14)

E555 02

# 7 - HYDRAULIC DIAGRAMS

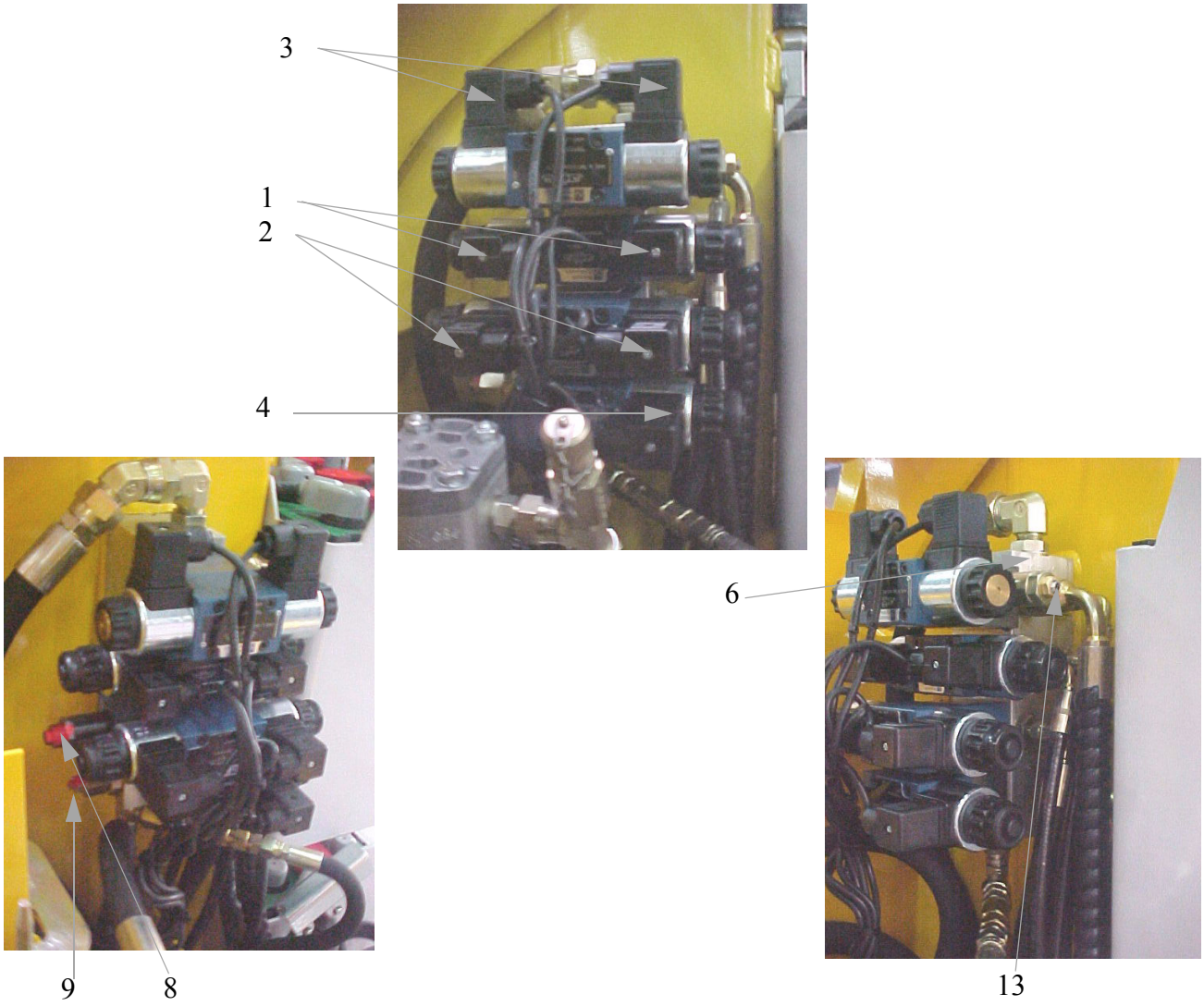


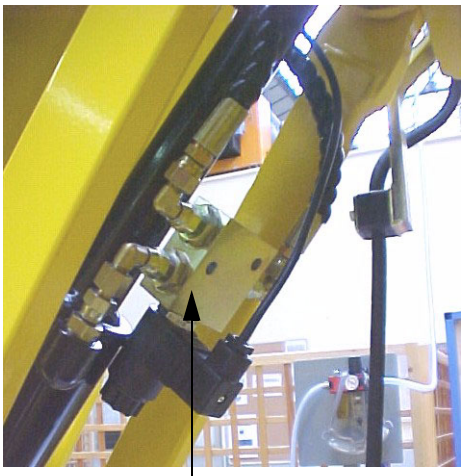


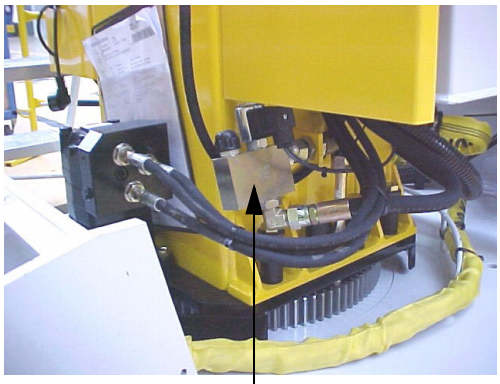

For more information about both diagrams please refer to your spare parts manual.

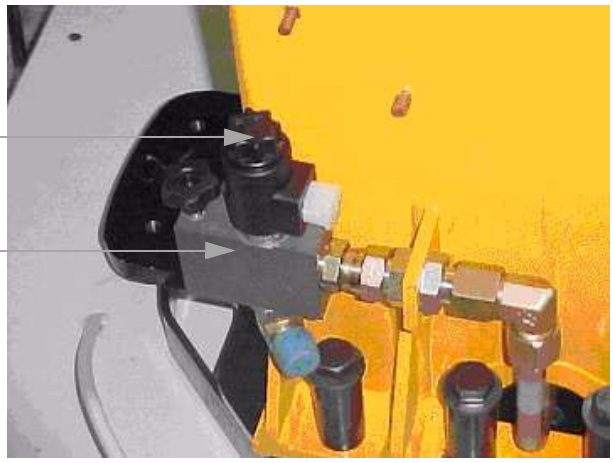
# 8 - POSITIONS OF HYDRAULIC COMPONENTS

| | | |
|---|---|---|
| 1 | YV1 | Steering electrovalve |
| 2 | YV2 | Turntable rotation motor control electrovalve |
| 3 | YV3 | Jib up/down electrovalve |
| 4 | YV4 | Up/down control electrovalve<br>When idle, down if YV6 = 1 |
| 5 | YV5 | Power supply selection electrovalve. When idle, supply of the small chamber of the mast lifting telescopic cylinder. In work, supply of the jib |
| 6 | | Distributor |
| 7 | YV6 | Telescopic lifting cylinder down control electrovalve |
| 8 | | Main pressure regulator set at 160 bars |
| 9 | | Lifting pressure regulator set at 45 bars |
| 10 | | Emergency lowering manual valve |
| 11 | YV6 | Emergency lowering electrovalve |
| 12 | | Emergency pump |
| 13 | | Steering pressure regulator set at 100 bars |




5


7


10
11

12

# 9 - MAINTENANCE

## 9.1 - GENERAL RECOMMENDATIONS

The servicing operations described in this manual are given for normal operating conditions.

In difficult conditions: extreme temperatures, high humidity, polluted atmosphere, high altitude, etc., some operations may need to be performed more often and specific precautions may be necessary: consult the HAULOTTE after-sales service for more information.

Only authorized and skilled personnel may work on the machine and safety instructions related to personnel and environment protection must be respected.

Regularly check that the safety systems work properly

***Caution!***
***Do not use the machine as a welding ground-***
***Do not weld without disconnecting the (+) and (-) terminals of the batteries-***
***Do not use the battery to jumpstart other vehicles.***

***IMPORTANT: REMOVE ALL COVERS BEFORE WORKING ON THE TURNTABLE COMPONENTS.***

## 9.2 - SPECIFIC RECOMMENDATIONS

Before any maintenance intervention on the overhead platform, indicate on the turntable and platform control stations that the machine is being serviced. If possible, restrict access to the platform to maintenance personnel only.

### 9.2.1 - SPECIFIC TOOLS

Personnel should therefore be familiar with the use of the specific tools required (measurement devices, torque tightening devices, lifting apparatus, etc.) and respect the operating limits specified in the documentation supplied with the tools.

Incorrect use of a tool (incorrect adjustment after a reading error) may cause premature deterioration of the platform (or more seriously, an accident) for which HAULOTTE cannot be held responsible.

### 9.2.2 - Replacing an element

Before replacing an element, the machine must be put in the maintenance configuration (see relevant chapter) and the electric power supply cut off (see relevant chapter).

All distributing valves are "with open center": breaking the electric circuit therefore decreases pressure in the hydraulic circuits, up to the non-return valves flanged on the cylinders. An element can be replaced safely, if the procedures described in the maintenance sheets are respected (unscrew hydraulic connectors slowly to release residual pressure).

To preserve the integrity of the safety systems and the technical characteristics of the platform, it is essential to use original parts and to respect the initial setting and tightening torque values (see relevant chapter).

### 9.2.3 - Locating the breakdown

Certain checks require the elevating platform to be switched on. In this case, personnel must ensure:

- that the measurement devices used are properly insulated,
- that they do not touch the live parts,
- that they are not wearing or carrying metal objects that may damage the live components (e.g.: dropping a wench when servicing the batteries).

## 9.3 - MAINTENANCE SYSTEM

***Maintenance configuration***

- Position the elevating platform on a firm, horizontal surface.
- Fold the machine completely.

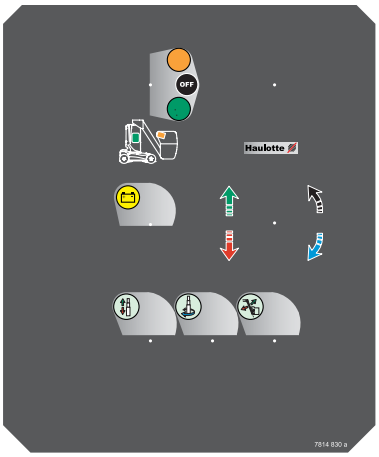
## 9.4 - ELECTRIC POWER SUPPLY

Instructions

***Cutting off the electric power supply:***

Press the turntable emergency stop near the control panel (Photo. 10, page 32).

Photo 10 Turntable control panel.




***Restoring the electric power supply:***

Reset the emergency stop (Photo. 10, page 32).

## 10.1 - MAINTENANCE PLAN

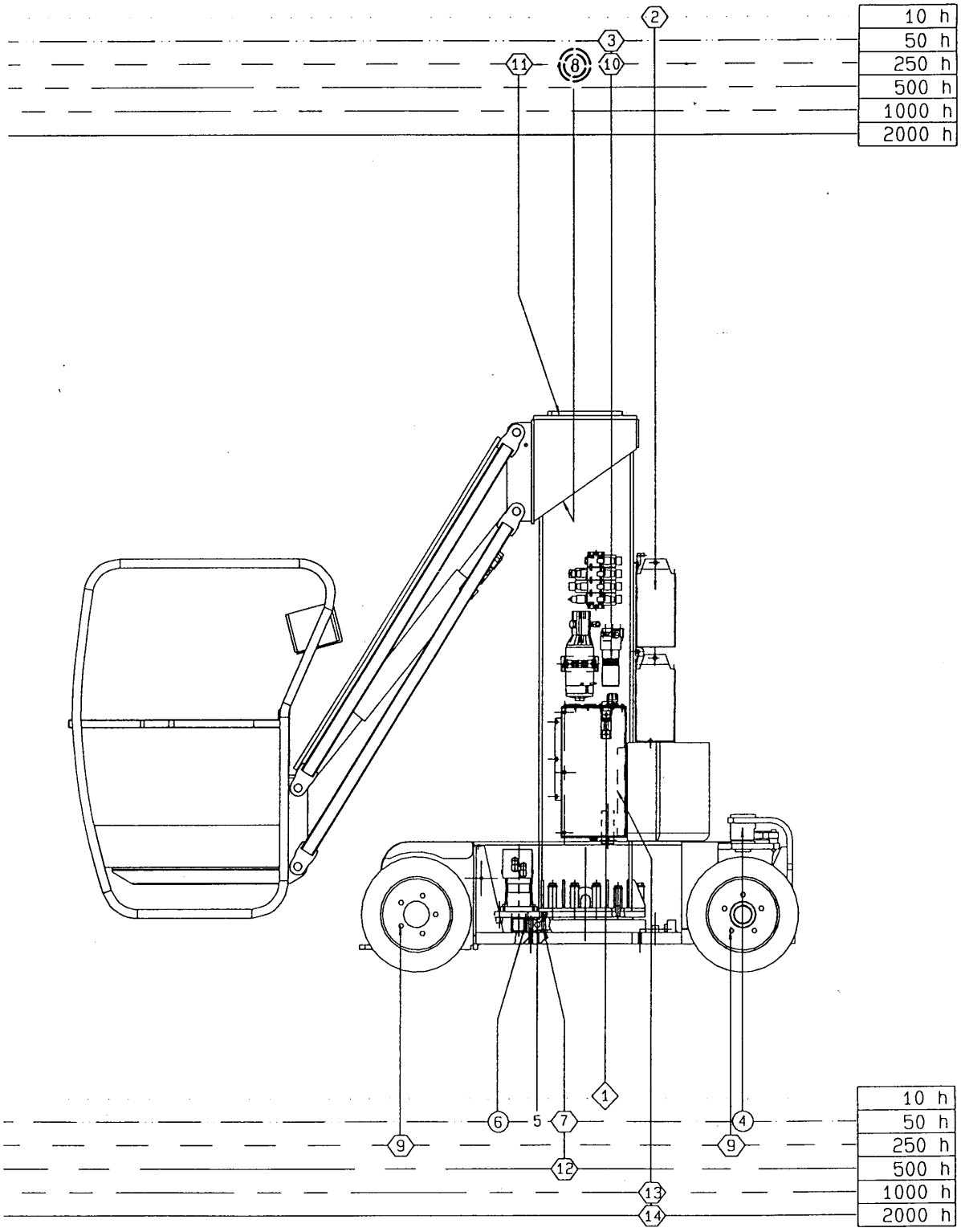
The plan on the next page shows the periodicity, point of maintenance (device) and consumables to be used.

- The reference in the symbol indicates the maintenance area based on the periodicity.
- The symbol represents the consumable to be used

### 10.1.1 -Consumable.

| CONSUMABLE | SPECIFICATION | SYMBOL | Lubricants used by HAULOTTE | ELF | TOTAL |
|---|---|---|---|---|---|
| Hydraulic oil | AFNOR 48 602ISO V G 46 | | BPSHF ZS 46 | HYDRELFDS 46 | EQUIV-ISZS 46 |
| Extreme pressure lithium grease | ISO - XM - 2 | | | CARDREXA-DC 1 | |
| Lead-free grease | Grade 2 or 3 | | ESSOGP GREASE | MULTIMOTIVE 2 | MULTIS EP 2 |
| Exchange or specific operation | | | | | |
| Loctite 8021 LS 60 cat. No. 26470 | | | | | |
| ORGANIC hydraulic oil (OPTION) (see page 35) | Organic oil ISO 46 | | SHELL Naturel-le HF-E | | |
| Extreme cold hydrau-lic oil (OPTION) (see page 35) | AFNOR 48 602ISO V G 32 | | SHELL TELLUS T-32 | | |

## 10.1.2 -Maintenance plan



## 10.1.3 -OPERATIONS

***IMPORTANT: IF ORGANIC OR EXTREME COLD OILS ARE USED, THE PERIODICITIES IN THE TABLE BELOW ARE REDUCED BY HALF.***

| PERIODICITY | OPERATION | REFERENCE |
|---|---|---|
| **Every day or before each start of operations** | • ·Check:<br>- hydraulic tank level. See chap. 4.3.3.<br>- electrolyte level in the batteries. See chap. 4.3.3. | drawing ref.1<br><br>drawing ref.2 |
| **Every 50 hours** | • Grease:<br>- wheel pivot pins.<br>- ring: bearing.<br>- ring: teeth.<br>CAUTION<br>after first 50 hours:<br>• Change the hydraulic filter cartridge. See chap. 5.3.1. (see 250 hours periodicity)<br>• Check tightness of slew ring screws. (see 500 hour periodicity) | drawing ref.4<br>drawing ref.5<br>drawing ref.6<br><br>drawing ref.3<br><br>drawing ref.7 |
| **Every 250 hours** | • ·Change the hydraulic filter cartridge See chap. 5.3.1.<br>• ·Grease the friction parts of the mast, check pad wear.<br>• Check the tightness of<br>- wheel nuts.<br>- upper clevis screws | drawing ref.10<br><br>drawing ref.8<br><br>drawing ref.9<br>drawing ref.11 |
| **Every 500 hours** | • Check the tightness of the ring screws.<br>• If using organic oil, empty the hydraulic oil tank. | **drawing ref.12** |
| **Every 1000 hours** | • Empty the hydraulic oil tank (capacity 25 l).See chap. 5.3.3. | **drawing ref.13** |
| **Every 2000 hours** | • Empty the hydraulic oil tank and the whole circuit See chap. 5.3.3. | **drawing ref.14** |

## 10.2 - PRESENCE OF LABELS

Make sure that the labels and plates informing personnel of the various dangers related to machine use are in good condition.

The labels also inform operators on the use and maintenance of the machine.

An illegible label may result in incorrect or dangerous use of the machine.

**Instructions:**

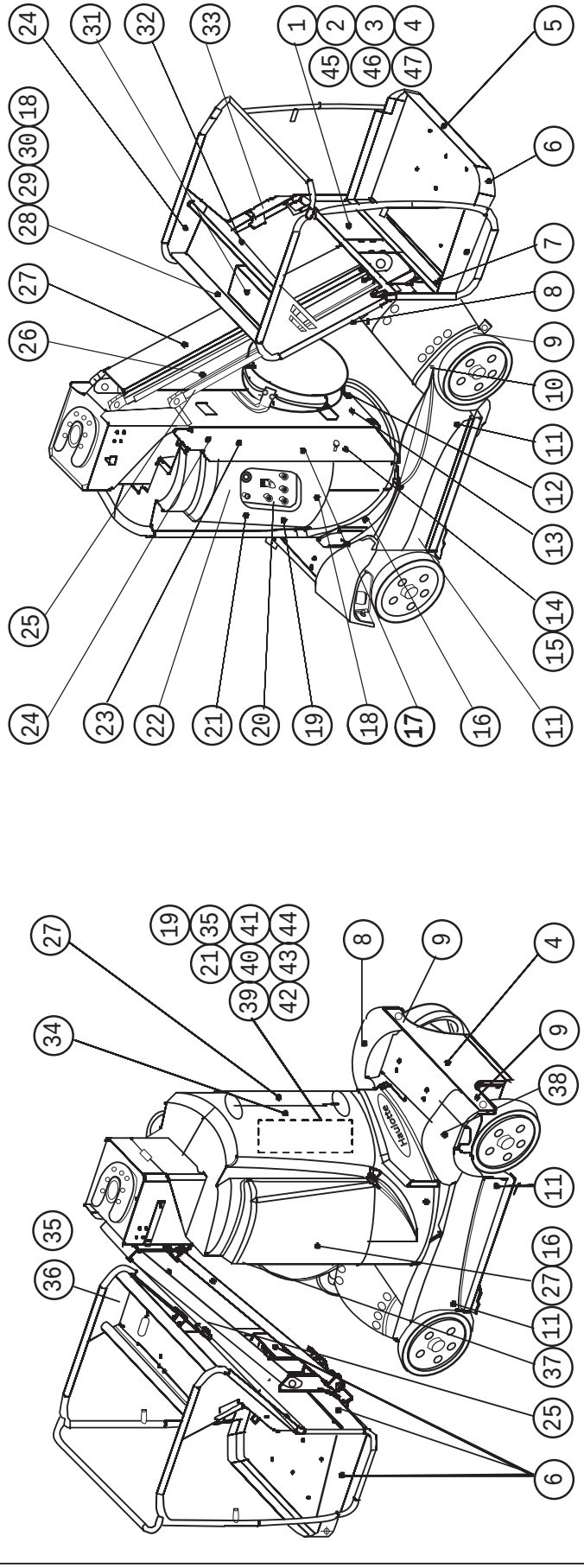
***Check that the labels are present:***

Check that all the labels described below are legible and in place. Replace if necessary (additional copies can be supplied on request).

### 10.2.1 -Labels' positions

| Ref | Code | Qty | Description |
|---|---|---|---|
| 1 | 2420318260 | 1 | Spare parts manual E.08.02 |
| 2 | 3078143420 | 1 | Operator's manual E. 08.02 |
| | 2420505950 | 1 | Warranty activation |
| 3 | 3078147290 | 1 | "Read CE operation manual" |
| 4 | 2420319690 | 1 | Repair manual E. 05.03 |
| 5 | 3078148770 | 2 | "Haulotte" logo |
| 6 | 2421808660 | 1 | Black/yellow adhesive marking (total length : 7 ft 2 $^{1/2}$ in) |
| 7 | 3078148900 | | "110V plug" label |
| 8 | 3078147270 | 2 | "Do not stand on the hood" decal |
| 9 | 3078147930 | 4 | "Sling fastener" |
| 10 | 3078138820 | 1 | Green arrow |
| 11 | 3078149290 | 4 | "Fork-lift truck fork location" decal |
| 12 | 3078149360 | 1 | Mast emergency lowering |
| 13 | 3078148760 | 1 | Manufacturer's plate |
| 14 | 3078147580 | 1 | 110 V socket position |
| 15 | 3078148620 | 1 | Battery charger socket position |
| 16 | 3078147240 | 2 | Danger : hand / finger crush hazard |
| 17 | 3078149370 | 1 | ON / OFF |
| 18 | 3078149340 | 2 | Floor height + load capacity |
| 19 | 3078147220 | 2 | Caution : do not use as a welding ground |
| 20 | 3078148300 | 1 | Turntable control station |
| 21 | 3078147890 | 1 | Voltage chart |
| 22 | 3078147050 | 1 | Operating instructions |
| 23 | 3078149280 | 1 | Do not use the machine during charging |
| 24 | 3078149300 | 2 | Electrocution hazard - the machine is not insulated |
| 25 | 3078149390 | 2 | Vertical body crush hazard |
| 26 | 3078148630 | 1 | Power supply on platform |
| 27 | 307P201580 | 1 | Vertical Star 22 J logo |
| 29 | 3078149350 | 1 | Danger : travel direction |
| 30 | 3078150870 | 1 | Complementary safety instructions |
| 31 | 307P203690 | 1 | Platform control panel |
| 32 | 307P201510 | 1 | Permissible load |
| 33 | 3078147950 | 2 | Safety harness |
| 34 | 3078147260 | 2 | Horizontal body crush hazard |
| 35 | 3078149380 | 1 | Jib emergency lowering |
| 36 | 307P201500 | 1 | Symbols' summary |
| 37 | 3078149310 | 1 | Do not stand in the working area |
| 38 | 3078148330 | 1 | Red arrow |

| Ref | Code | Qty | Description |
|---|---|---|---|
| 39 | 3078147140 | 1 | Hydraulic oil |
| 39 | 3078148920 | 1 | Organic hydraulic oil |
| 40 | 3078147210 | 1 | Oil level |
| 41 | 3078147350 | 1 | Wear protective clothing |
| 42 | 3078147330 | 1 | Servicing of batteries |
| 43 | 3078148810 | 1 | Emergency movements |
| 44 | 3078148030 | 1 | Danger : explosion hazard |
| 45 | 2420316420 | 1 | Safety manual |
| 46 | 2420316430 | 1 | Manual of responsibilities |
| 47 | 2420313920 | 1 | Owner’s manual |


24
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B 16558 b

## 10.3 - PRESENCE OF MANUALS

It is important to ensure that the manuals supplied with the machine are in good condition and stored in the document holder provided on the platform.

An illegible manual may lead to incorrect or dangerous use of the machine.

**Operating instructions:**

Check presence of manuals:

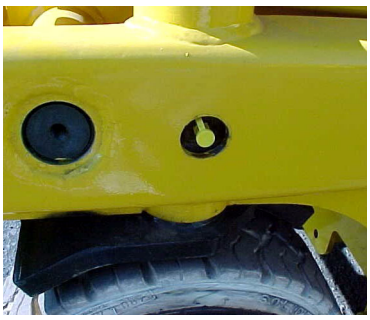
Check that the manuals are legible, complete and stored in the document holder provided on the platform. Replace if necessary (extra copies can be supplied on request by the manufacturer).

# 11 -PREVENTIVE MAINTENANCE SHEETS

List of preventive maintenance sheets:

| *Sheet no.* | *Description* |
|---|---|
| P003 | Lubricating the steering wheel pivots |
| P005 | Checking - filling the hydraulic oil tank |
| P006 | Changing the hydraulic filter cartridge |
| P010 | Checking - servicing the traction batteries |
| P011 | Lubricating the mast |

| SHEET P003 | PREVENTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | GREASING THE STEERING WHEEL PIVOTS | |



Compact, optimum, previous design

Compact, optimum, current design

## 1 - Greasing the steering wheel pivots

•Cut off the electric power supply (see § 6.3, page 22).
•Grease the pivots.

*NOTA : Only use the grease recommended by the manufacturer.*

•Put the machine back into the operational configuration

.

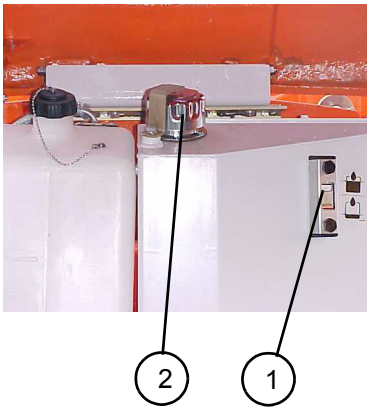
Star 22J / Star 8

| | | |
|---|---|---|
| | PREVENTIVE MAINTENANCE SHEET | |
| | | |

| Sheet P005 | PREVENTIVE MAINTENANCE SHEET | Folio 1/1 |
|---|---|---|
| | CHECKING / FILLING<br>THE HYDRAULIC OIL TANK | |

**1 - Preliminary operations**

- Put the machine in the maintenance configuration (see corresponding paragraph).
- Switch off electric power (see corresponding paragraph).




HA16/18PX - HA46/51JRT

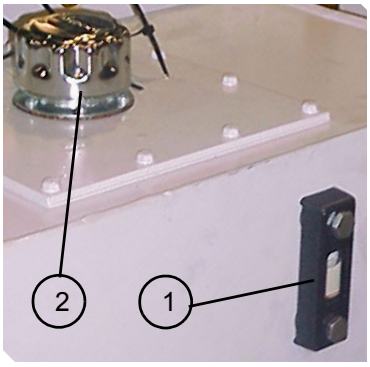
**2 - Checking - filling the hydraulic oil tank**

*NB: This operation must be carried out when the oil is cold, i.e. before starting the machine.*

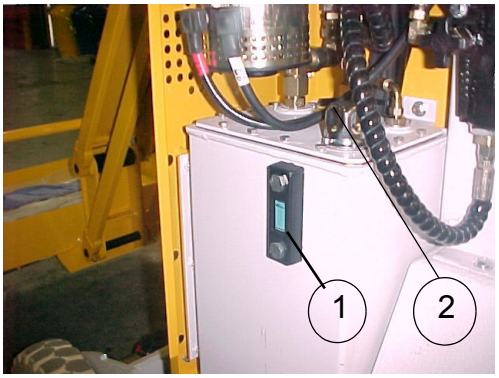
- Check that the level of oil (1) in the tank is between the high and low levels when cold.
- Top up if necessary, by filling via the cap (2).

*NB: Only use the oil recommended by the manufacturer.*

- Put the machine back into the operational configuration.




HA16/18PX New Design
HA46/51JRT New Design




Star 22 J / Star 8

| | | |
|---|---|---|
| | PREVENTIVE MAINTENANCE SHEET | |
| | | |

| Sheet P006 | PREVENTIVE MAINTENANCE SHEET | Folio 1/1 |
|---|---|---|
| | CHANGING THE HYDRAULIC FILTER CARTRIDGE | |

***Caution!***
***Use a container to collect oil to prevent pollution of the environment.***

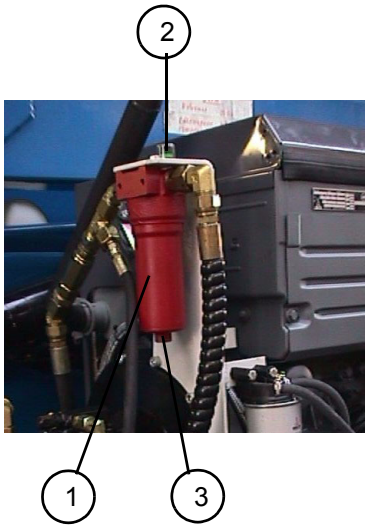
**2 - Preliminary operations**

- Put the machine in the maintenance configuration (see corresponding paragraph).
- Switch off electric power (see corresponding paragraph).

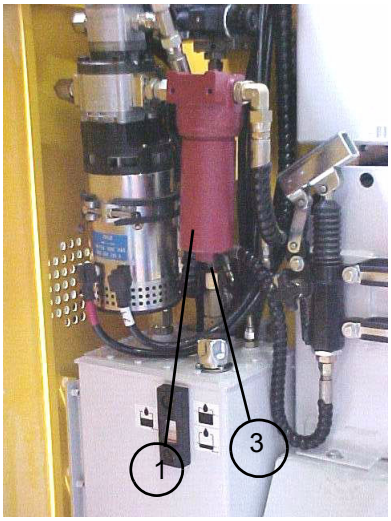
**2 - Replacing the hydraulic filter cartridge**

*NB:* *The filter has a clogging indicator. Clogging should be checked when the machine is hot, otherwise, the indicator may be visible due to the viscosity of the cold oil.*

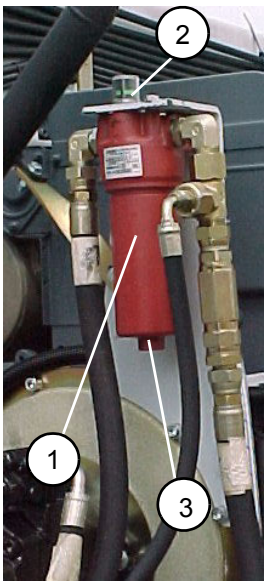
- Change the cartridge (1) if the clogging indicator appears (2).
- Unscrew the base nut (3) and remove the cartridge from the hydraulic filter.
- Screw a new cartridge into place.
- Put the machine back into the operational configuration.




**HA16/18 PX**
**HA46/51JRT**
**HA20/26 PX**
**HA61/80JRT**




STAR 22 J / Star 8




**H14P / H16TP**
**HB40/44J**

| | | |
|---|---|---|
| | PREVENTIVE MAINTENANCE SHEET | |
| | | |

| Sheet P010 | PREVENTIVE MAINTENANCE SHEET | Folio 1/2 |
|---|---|---|
| | CHECKING / SERVICING THE TRACTION BATTERIES | |

***Caution!***
***These operations require safety precautions (wear gloves and protective goggles).***

***Caution!***
***Do not electric arc weld on the machine without first disconnecting the batteries.***

***Caution!***
***Do not use the batteries to jump start another vehicle.***

**1 - Preliminary operations**

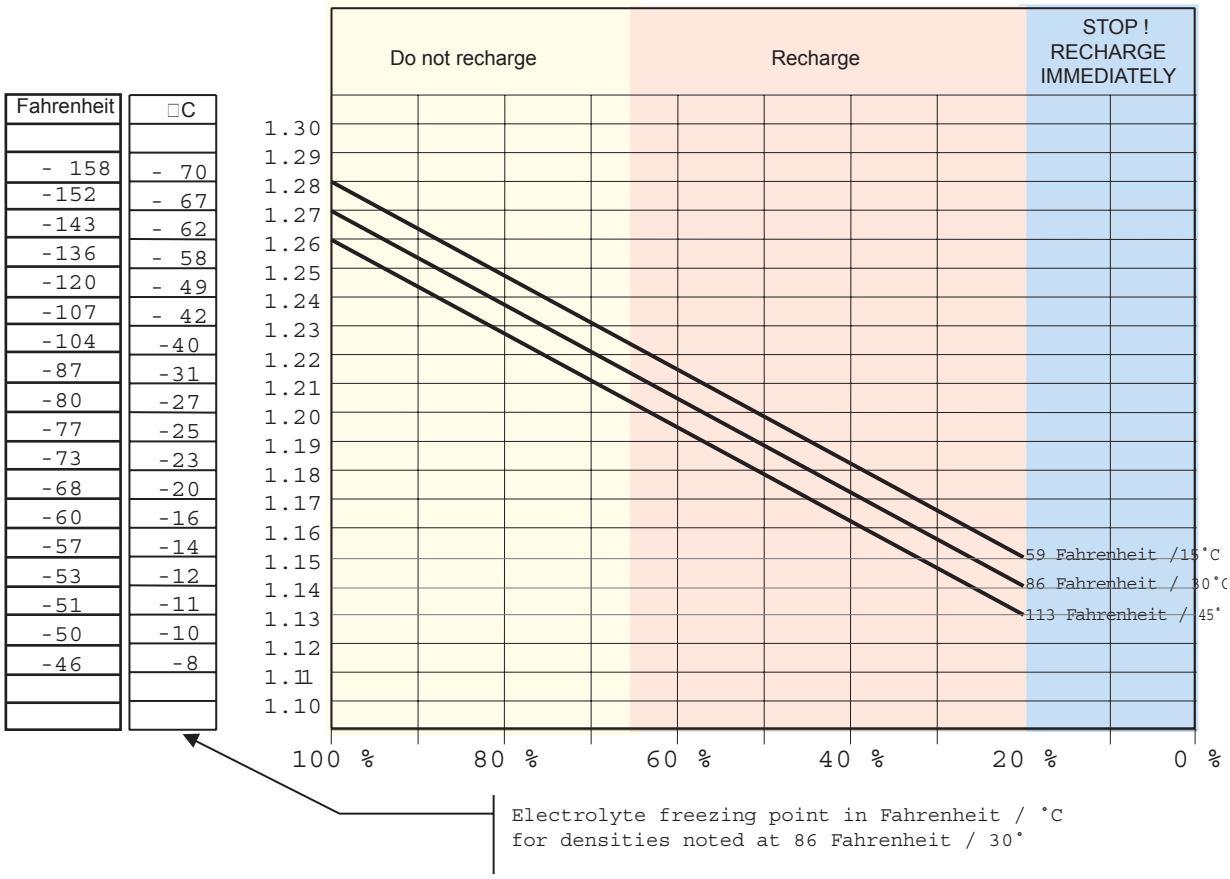
- Put the machine into the maintenance configuration (see relevant section).

**2 - Battery servicing**

- Check the electrolyte levels before charging once a week in normal use.
- If necessary, top up:
  - with distilled or de-mineralised water,
  - after charging.
- No not add acid (in the event of spillage, contact our After-sales department).
- Do not leave discharged batteries idle.
- Avoid overflow.
- Clean the batteries to avoid salt formation and current deviation.
- Wash the top without removing the caps.
- Dry with compressed air or clean cloths.
- Grease the lugs.

*NB:* *To enable rapid diagnosis of the state of your batteries, note the density of each element once a month, using a battery hydrometer, as a function of temperature, using the graph below (do not measure directly after filling*

| Sheet P010 | PREVENTIVE MAINTENANCE SHEET<br>CHECKING / SERVICING THE TRACTION BATTERIES | Folio 2/2 |
|---|---|---|




State of charge of a battery as a function of density and temperature

| Sheet P010 | PREVENTIVE MAINTENANCE SHEET | Folio 2/2 |
|---|---|---|
| | CHECKING / SERVICING THE TRACTION BATTERIES | |

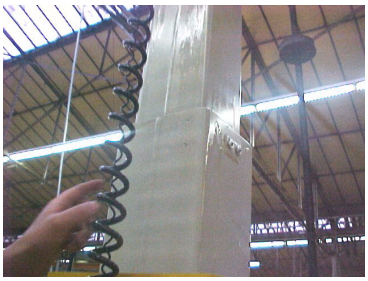
| SHEET P011 | PREVENTIVE MAINTENANCE SHEET | Folio 1/1 |
|---|---|---|
| | LUBRICATING THE MAST | |

**1 - Lubricating the mast**

- Extend the mast.
- Switch off the electric power supply (see relevant section).
- Grease the slides, at pad level, using a spatula.
- Grease the pads at the back of the machine.

*NB:* *Only use lubricants recommended by the manufacturer.*

- Put the machine back into the operational configuration.



| | | |
|---|---|---|
| | PREVENTIVE MAINTENANCE SHEET | |
| | | |

# 12 - OPERATING INCIDENTS

REMINDER: Respecting the machine's operating and servicing instructions will enable you to avoid most incidents.

However, certain incidents may arise and before any intervention, it is essential to consult table 6.1. If the incident is listed, simply follow the instructions.

Only common incidents whose solutions can be implemented by an operator are listed. For all other incidents, contact your PINGUELY HAULOTTE representative or the plant's After-sales service.

Before diagnosing a failure, check that:

- the emergency stop "palm buttons" on the turntable and platform are unlocked
- the circuit breakers on the turntable panel are pushed in.

The speed chopper has a failure indication system on the timer display. To diagnose a failure, consult the table below, note the alarm code and pass it onto the After-sales service, who will given you the instructions to follow.

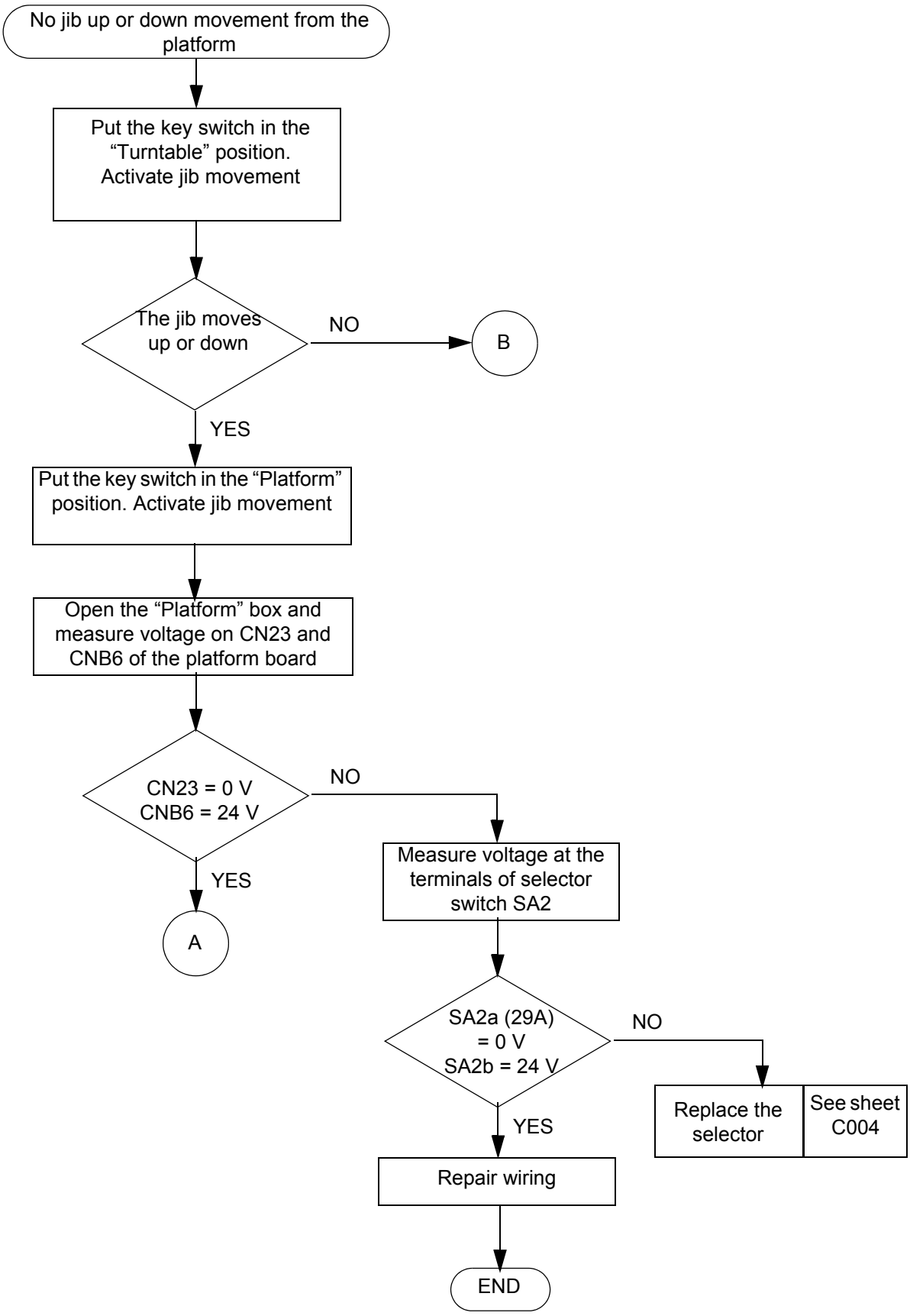
## 12.1 - TROUBLE-SHOOTING

| CODE | ALARM | PROBABLE CAUSES | REMEDIES |
|---|---|---|---|
| 1 | **LOW BATTERY** | • The battery is discharged.<br>• The alarm is only indicated if the "BATTERY CHECK" option has been selected.<br>• Reduces the traction current and disables lifting movements at approximately 10% of residual charge. | • Recharge the batteries. |
| 2 | **CAPACITOR CHARGE** | • The alarm is given if the capacitors take more than 500 ms to charge, in the "KEY ON" position.<br>• The most likely cause is a fault on the unit or power supply. | • Exchange the chopper |
| 3 | **NO ISOLATION** | • Indicates a + or - current leak to the machine chassis. | • Search for an insulation fault on the machine |
| 4 | **PRESSURE NOT OK** | • The overload pressure switch has detected an overload in the basket. | • Unload the platform |
| 5 | **STEER SENSOR KO** | • The microprocessor indicates that the steering potentiometer signal is not in the range defined in the program. | • a) program error;<br>• b) broken steering potentiometer. |
| 6 | **RISERVATO AD MDI** | • No serial line reception | • Check display panel connection |
| 7 | **CONTACTOR DRIVER** | • This alarm is indicated if there is an error on the closed mains switch. | • a) driver open;<br>• b) fault in the switch control circuit. |
| 8 | **CONTACTOR CLOSED** | • Test performed on switching on, checking that the mains switch is actually open. | • a) mains switch stuck;<br>• b) this alarm may be caused by a malfunction of the field power unit. |
| 9 | **DRIVER SHORTED** | • This alarm is indicated in the case of an error on the open mains switch | • a)its coil is in short-circuit;<br>• b)anomaly in the switch control circuit;<br>• c)cabling error;<br>• d)fault in the safety system circuit (often related to "POWER FAILURE") |
| 10 | **SERIAL ERROR #1** | • Incorrect reception or reception of an incoherent message from the selected serial card. | • Check station connectors |
| 11 | **BRAKE DRIVER KO** | • This alarm appears when there is a problem on the electrobrake driver. | • a) driver in short--circuit;<br>• b) defective driver;<br>• c) defective voltage command circuit on the electrobrake. |
| 12 | **MICRO CONTROL KO** | • The logic micro-controller or its links are defective | • |
| 13 | **FORW + BACK** | • The test is performed continuously, giving the alarm if two operation directions are given at the same time. | • a)Defective cabling;<br>• b)Operation micro switch stuck;<br>• c)Erroneous movement |

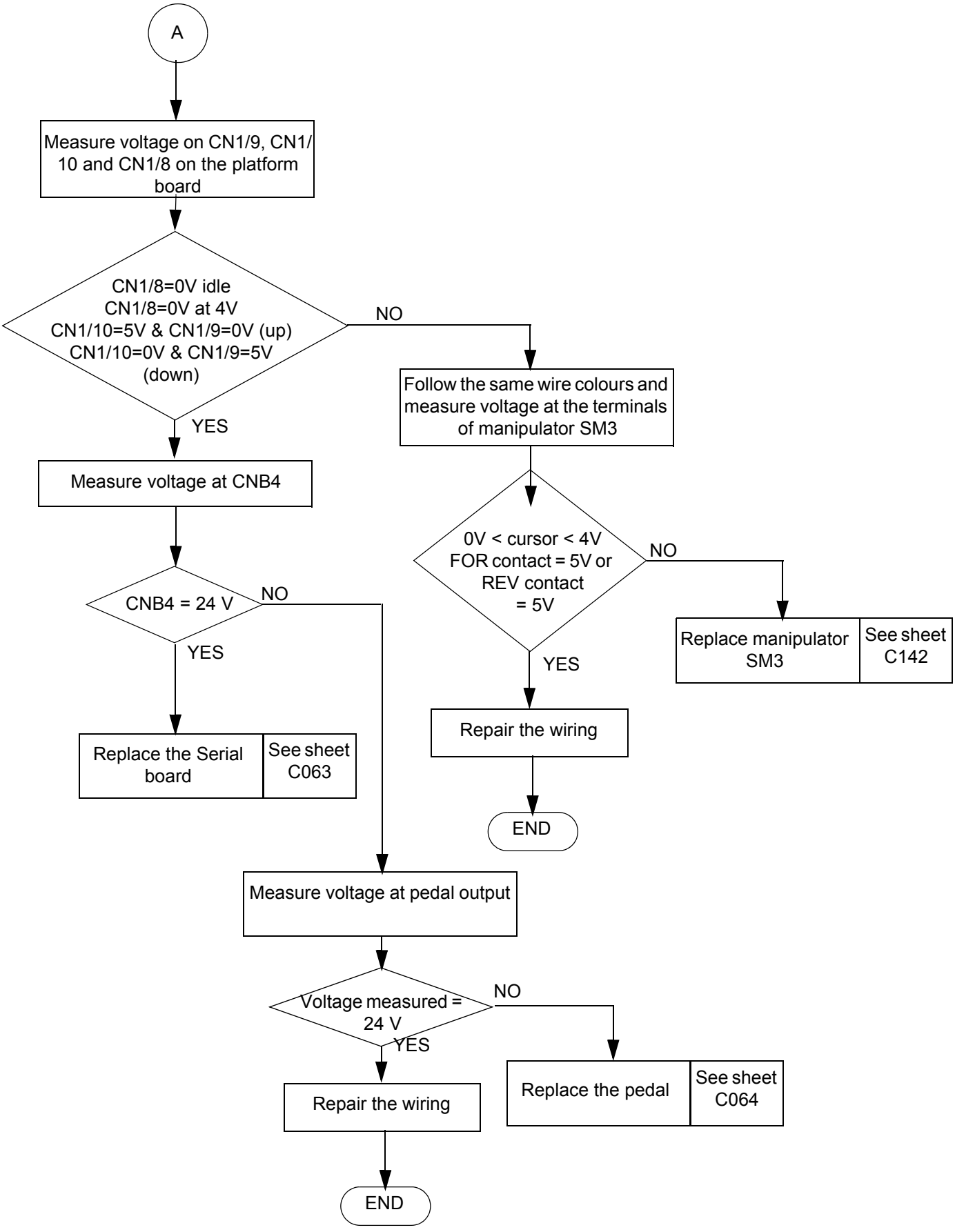
| CODE | ALARM | PROBABLE CAUSES | REMEDIES |
|---|---|---|---|
| 14 | **INCORRECT START** | • Incorrect start sequence. The machines only starts if the sequence is respected: key-bar (or seat) - operation | • Humidity in the upper station: blow the card. |
| 15 | **POWER FAILURE** | • Short-circuit on the valve, on the mains or on the brakes. | • |
| 16 | **RIGHT I = 0 EVER** | • The test is performed during operation: it checks that during operation, current is greater than a minimum value. Otherwise, this alarm appears and the machine is blocked. | • a) See RIGHT STBY I HIGH |
| 17 | **LEFT I = 0 EVER** | | |
| 18 | **R VMN NOT OK** | • The test is performed during active and inactive periods. It checks coherence of the VMN in relation to the command | • a) Check that motor cabling is correct;<br>• b) Check that the motor is insulated from the chassis;<br>• c) Power fault |
| 19 | **L VMN NOT OK** | • The test is performed during active and inactive periods. It checks coherence of the VMN in relation to the command | • a) Check that motor cabling is correct;<br>• b) Check that the motor is insulated from the chassis;<br>• c) Power fault |
| 20 | **LEFT STBY I HIGH** | • The test is performed during inactive periods and checks that the current is zero. If it is not, the alarm is given. The alarm disables the machine. | • a) The current sensor is broken<br>• b) Fault on the retroaction circuit or logic or power unit |
| 21 | **RIGHT STBY I HIGH** | | |
| 22 | **HIGH FIELD CURRENT** | • Anomaly in the field current. Field current is not zero during inactive periods. | • a) anomaly on the current receiver;<br>• b) fault on the field power unit |
| 23 | **VFIELD NOT OK** | • Test performed during inactive periods. In such conditions, field input voltage should correspond to ½ Vbatt. The alarm is given if voltage is different from this value. | • a) Check that the motor is insulated from the chassis;<br>• b) The motor field is not connected to the chopper;<br>• c) Fault on the power section concerning the field |
| 24 | **NO FIELD CURRENT** | • Anomaly in the field current. The field current is zero during operation. | • a) anomaly on the current receiver;<br>• b) field cable disconnected |
| 25 | **EEPROM KO** | • Fault in the memory zone containing configuration parameter data. The alarm disables the machine. If the fault does not disappear after switching the ignition key on and off again, change the Eeprom. Parameters recorded previously may have been lost and replaced with default values. | • |
| 26 | **CHOPPER NOT CONFIGURATED** | • The chopper is not programmed or incorrectly programmed. | • |
| 27 | **THERMAL PROTECTION** | • This indication shows that chopper temperature is over 75°C. Minimum current is gradually reduced until zero when temperature reaches 90°C. | • |
| 28 | **EVP NOT OK** | • Proportional electrovalve command values incoherent | • |

| CODE | ALARM | PROBABLE CAUSES | REMEDIES |
|---|---|---|---|
| 29 | **CHECK UP NEEDED** | • Alarm informing that machine maintenance is due. Time >300 hours. Does not disable the machine but continues to show the fault until the message is eliminated (CHECK UP DONE on ON) | • |
| 30 | **CONTACTOR OPEN** | • The control microprocessor is defective. A dangerous situation not detected by the main microprocessor has been identified. | • |
| 31 | **VACC NOT OK** | • The test is performed during inactive periods. The alarm indicates that accelerator voltage is greater than 1 V compared with the minimum value recorded. | a) Potentiometer wire broken<br>b) Potentiometer cabling incorrect.<br>c) Potentiometer defective (interrupted)<br>• d) Serial command programming is incorrect (SERIAL TILLER) |

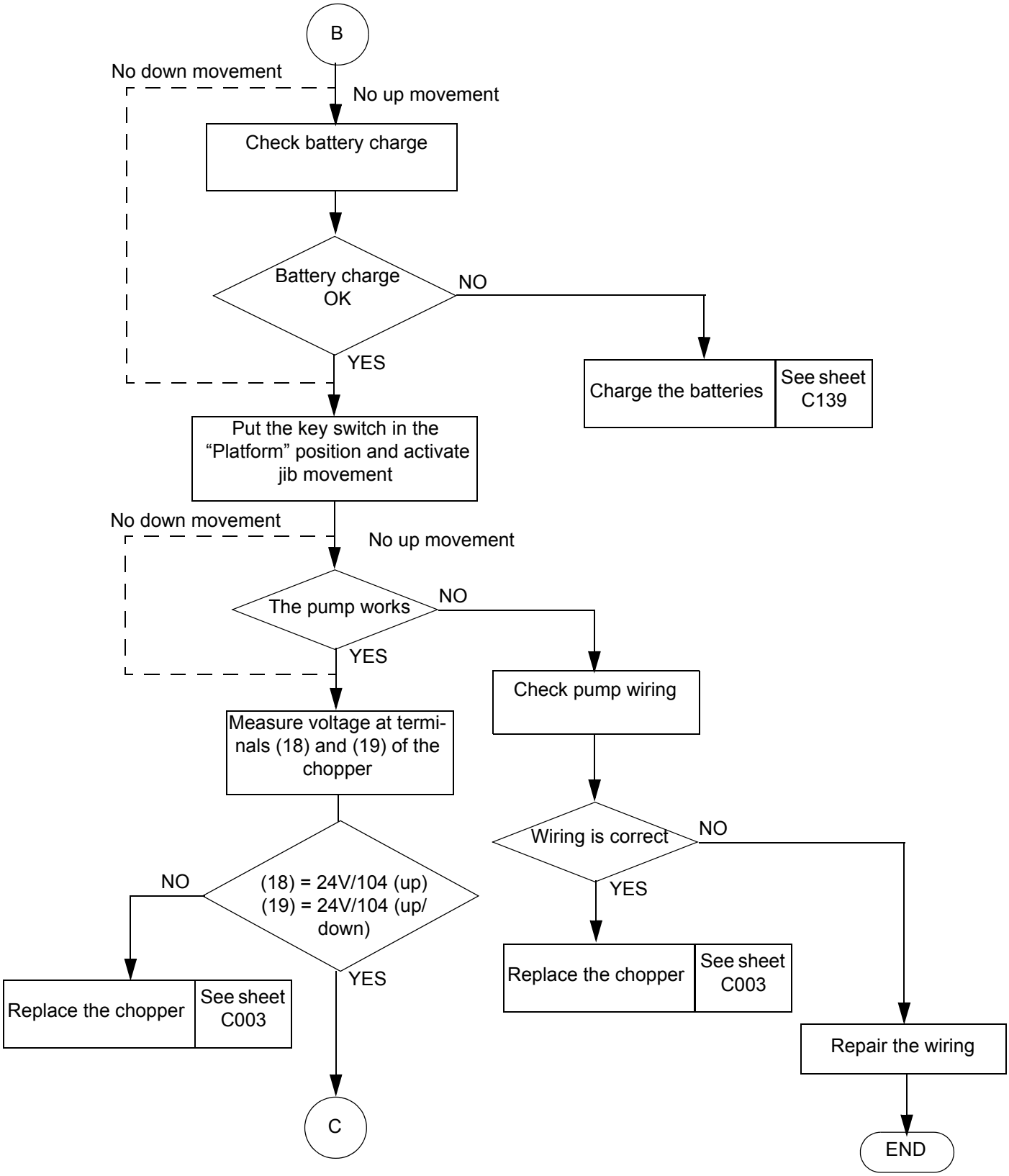
| Sheet DP075 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN JIB MOVEMENT FROM THE PLATFORM | Folio 1/6 |
|---|---|---|


No jib up or down movement from the platform
Put the key switch in the "Turntable" position. Activate jib movement
The jib moves up or down
NO
B
YES
Put the key switch in the "Platform" position. Activate jib movement
Open the "Platform" box and measure voltage on CN23 and CNB6 of the platform board
CN23 = 0 V
CNB6 = 24 V
NO
YES
A
Measure voltage at the terminals of selector switch SA2
SA2a (29A) = 0 V
SA2b = 24 V
NO
Replace the selector
See sheet C004
YES
Repair wiring
END

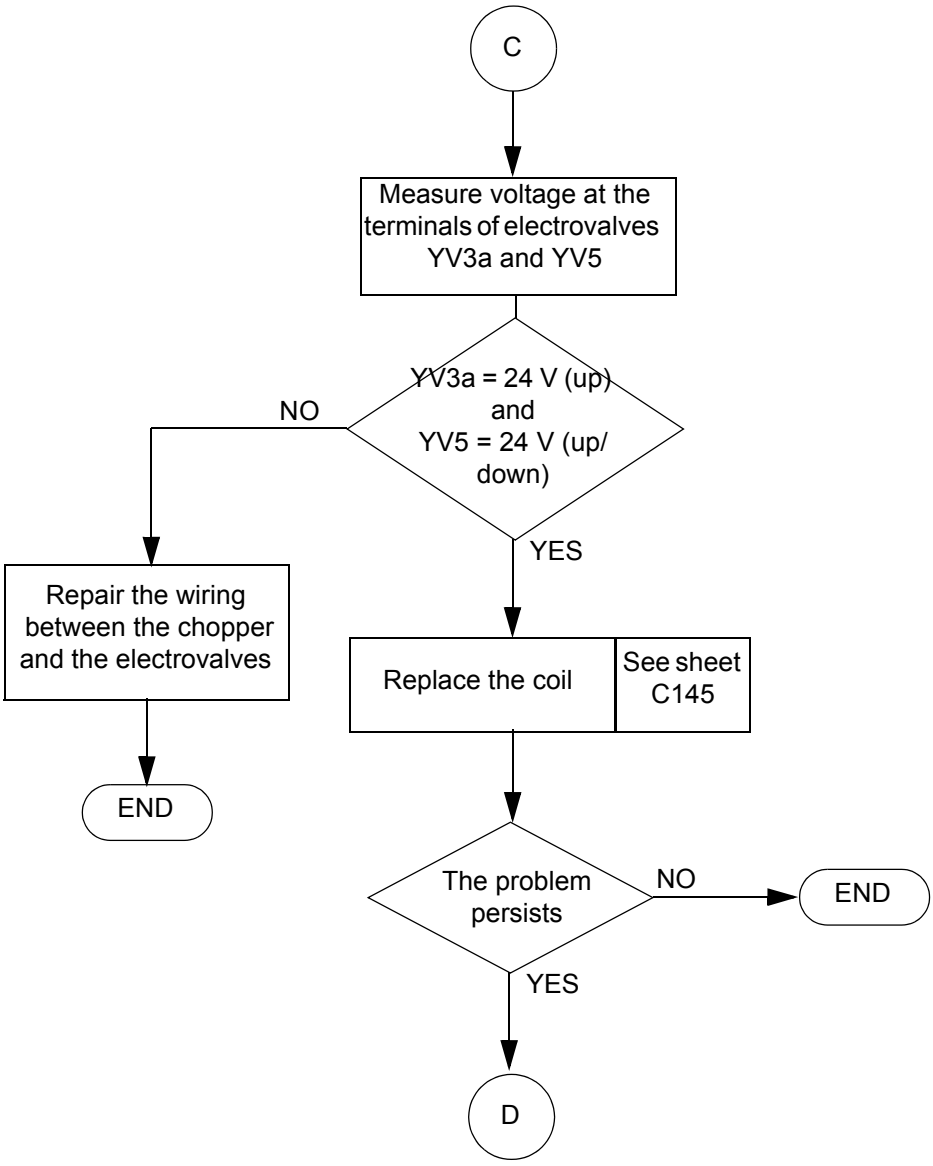
| Sheet DP075 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN JIB MOVEMENT FROM THE PLATFORM | Folio 2/6 |
|---|---|---|



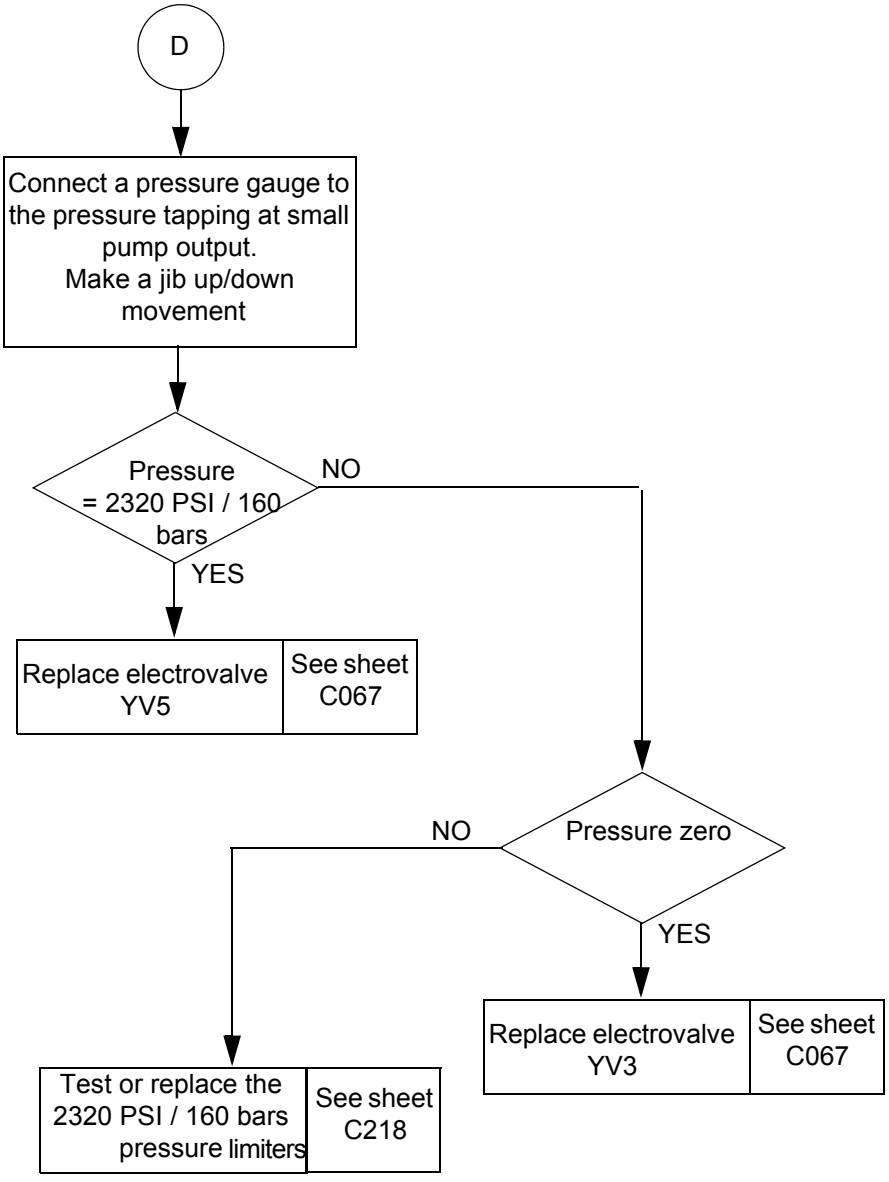
| Sheet DP075 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN JIB MOVEMENT FROM THE PLATFORM | Folio 3/6 |
|---|---|---|



| Sheet DP075 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN JIB MOVEMENT FROM THE PLATFORM | Folio 4/6 |
|---|---|---|

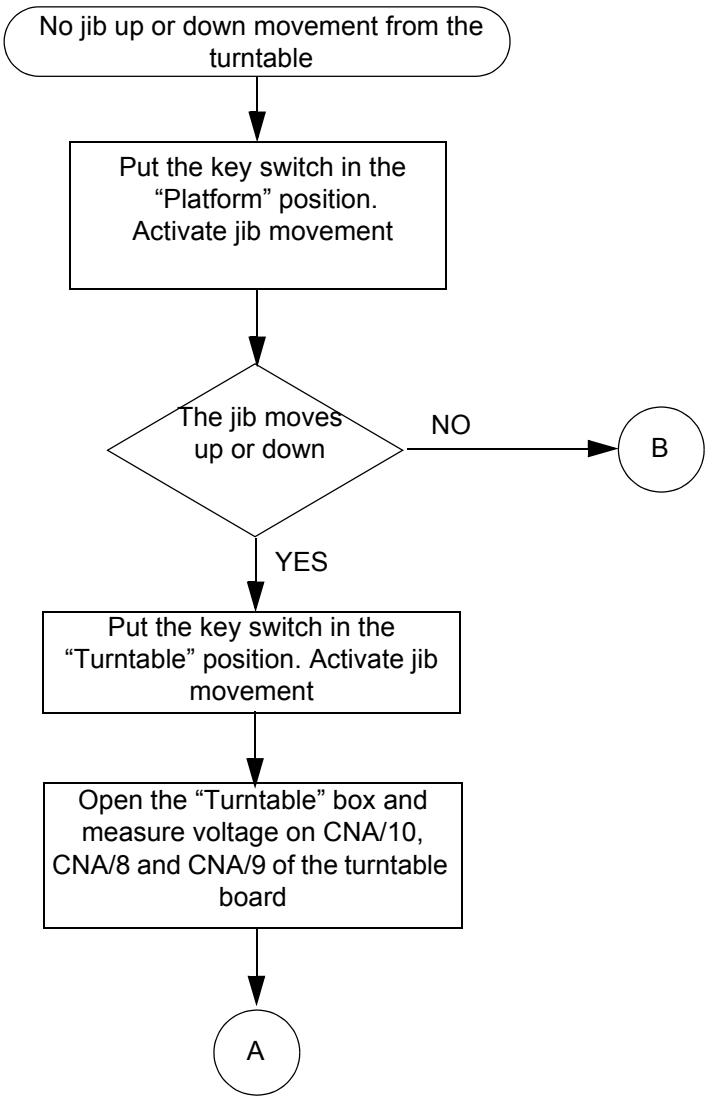


| Sheet DP075 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN JIB MOVEMENT<br>FROM THE PLATFORM | Folio 5/6 |
|---|---|---|

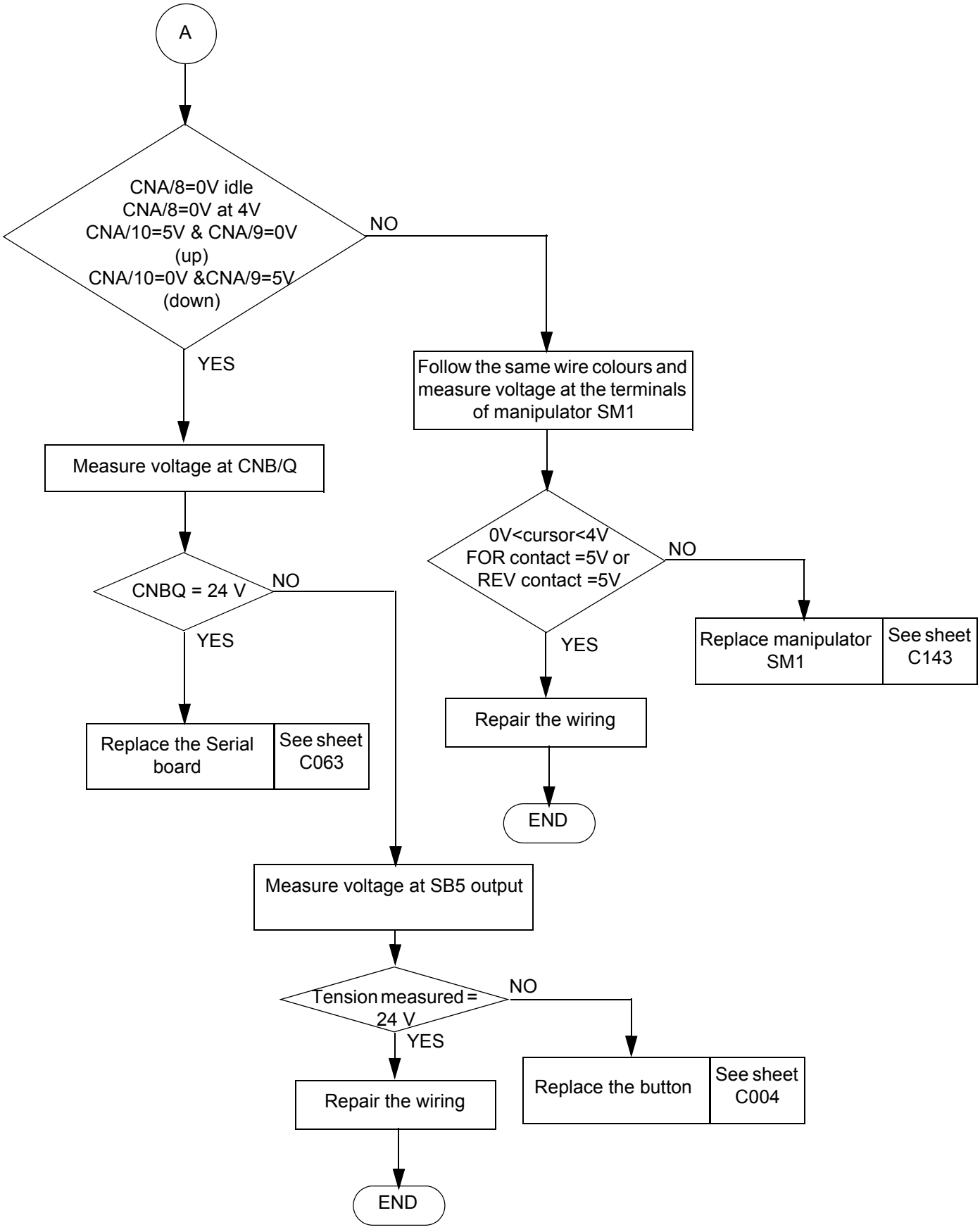


| | | |
|---|---|---|
| Sheet DP075 | BREAKDOWN DETECTION FLOW CHART | Folio 6/6 |
| | NO UP OR DOWN JIB MOVEMENT<br>FROM THE PLATFORM | |

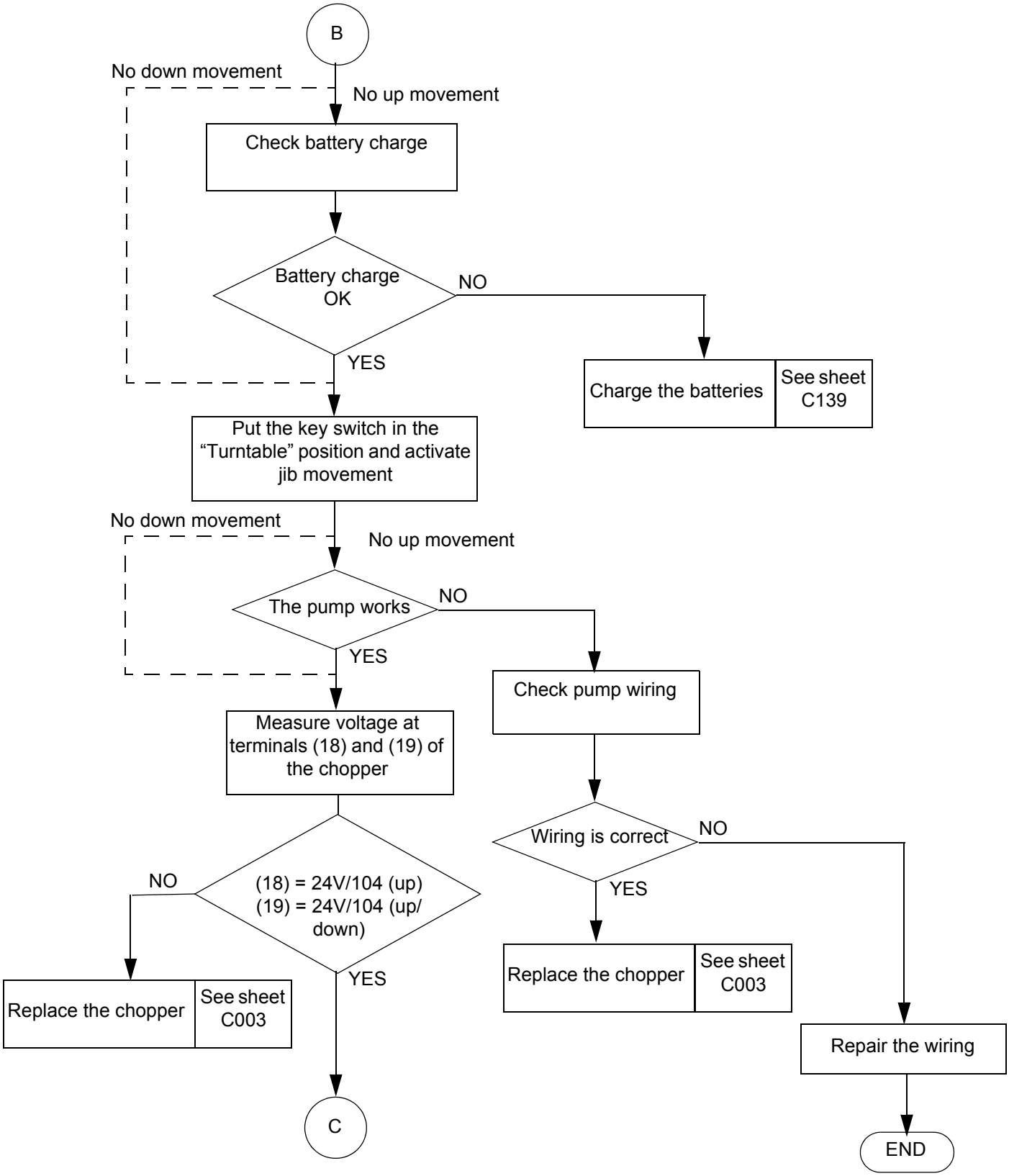
| Sheet DP076 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN JIB MOVEMENT FROM THE TURNTABLE | Folio 1/6 |
|---|---|---|


No jib up or down movement from the turntable
Put the key switch in the “Platform” position. Activate jib movement
The jib moves up or down
NO
B
YES
Put the key switch in the “Turntable” position. Activate jib movement
Open the “Turntable” box and measure voltage on CNA/10, CNA/8 and CNA/9 of the turntable board
A

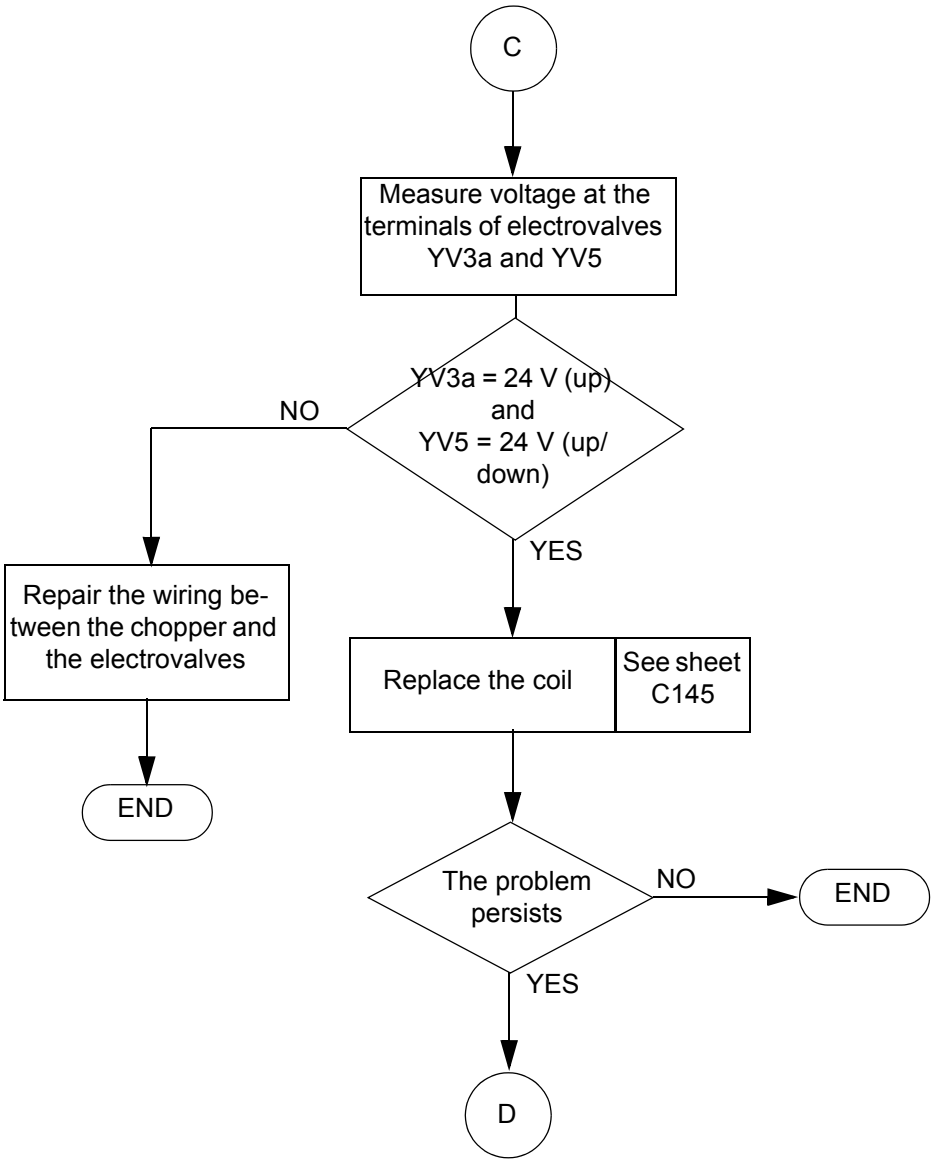
| Sheet DP076 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN JIB MOVEMENT<br>FROM THE TURNTABLE | Folio 2/6 |
|---|---|---|



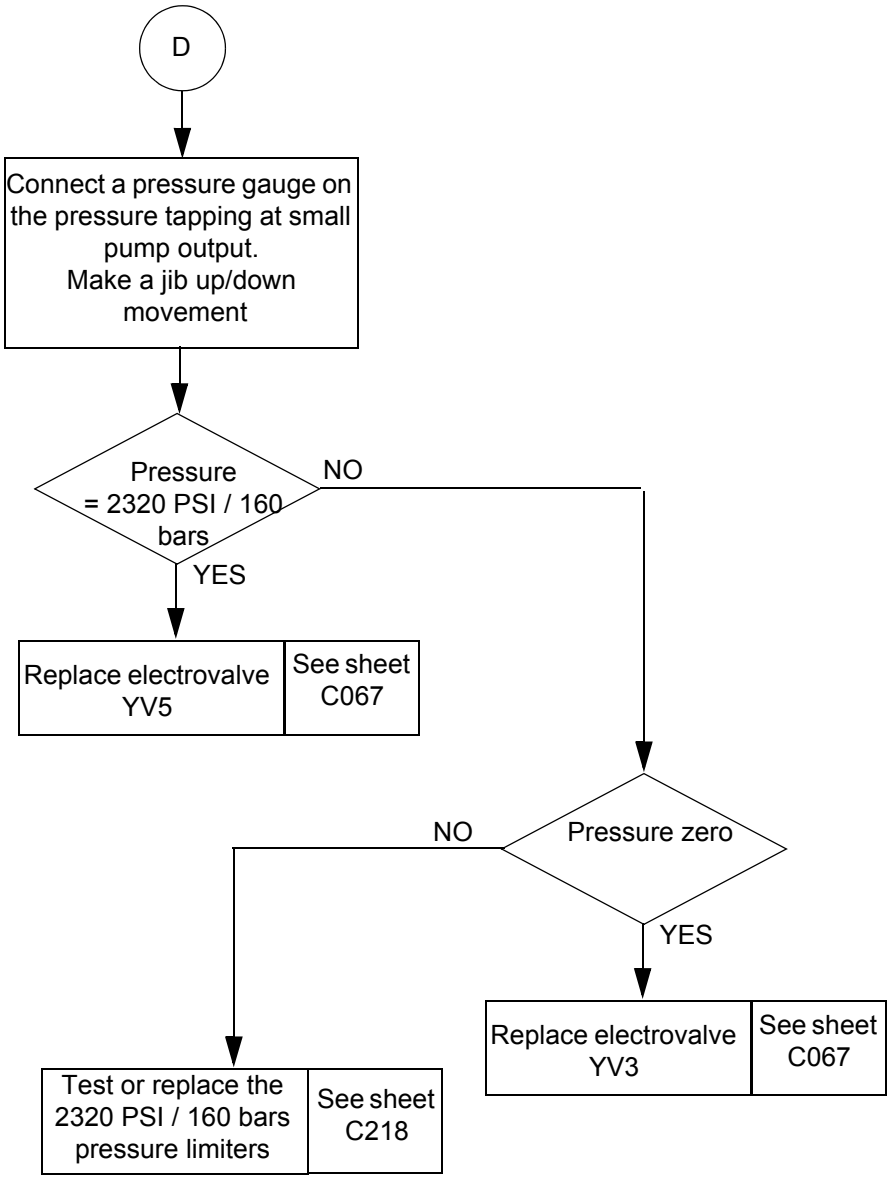
| Sheet DP076 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN JIB MOVEMENT<br>FROM THE TURNTABLE | Folio 3/6 |
|---|---|---|



| Sheet DP076 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN JIB MOVEMENT FROM THE TURNTABLE | Folio 4/6 |
|---|---|---|

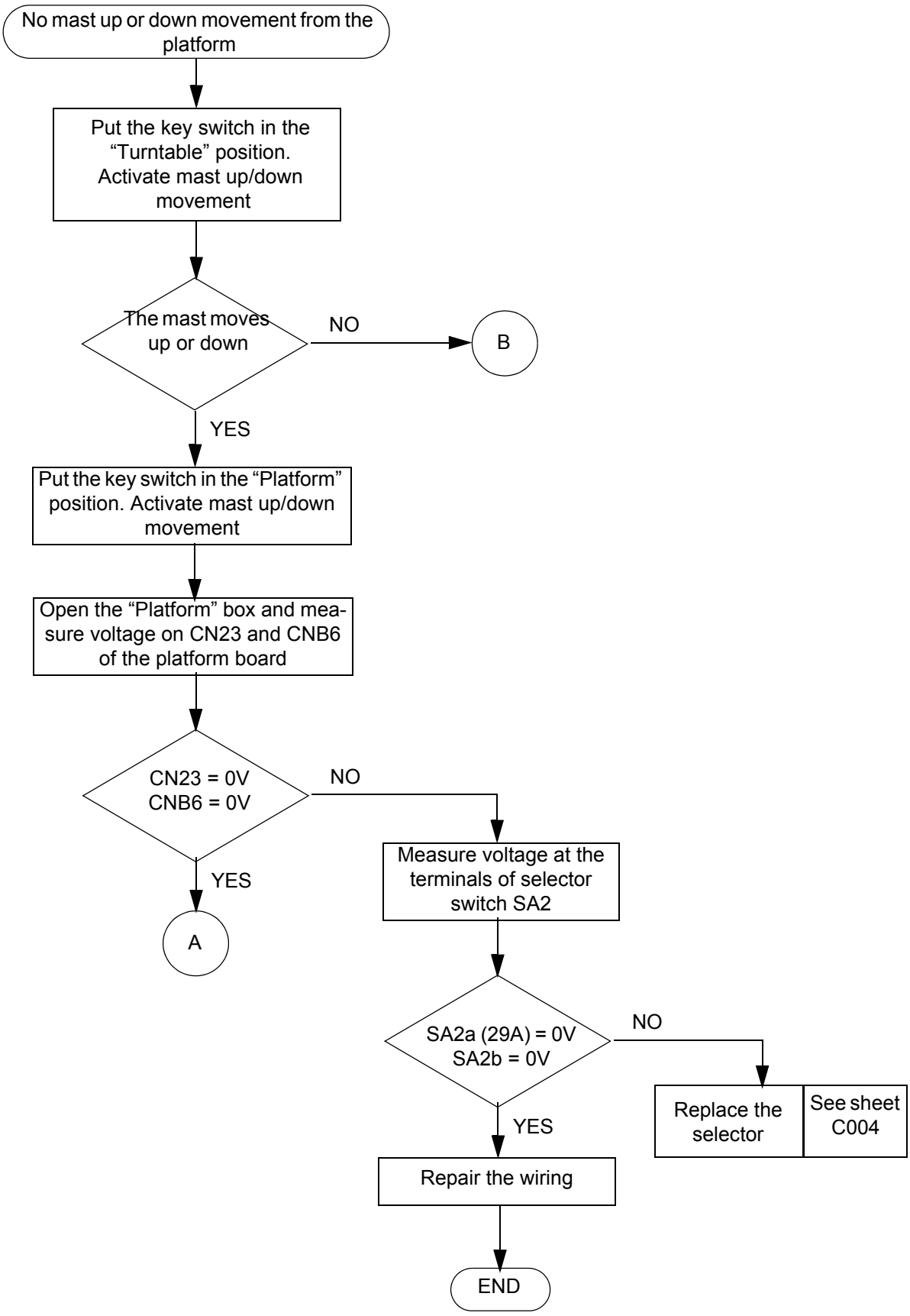


| Sheet DP076 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN JIB MOVEMENT<br>FROM THE TURNTABLE | Folio 5/6 |
|---|---|---|

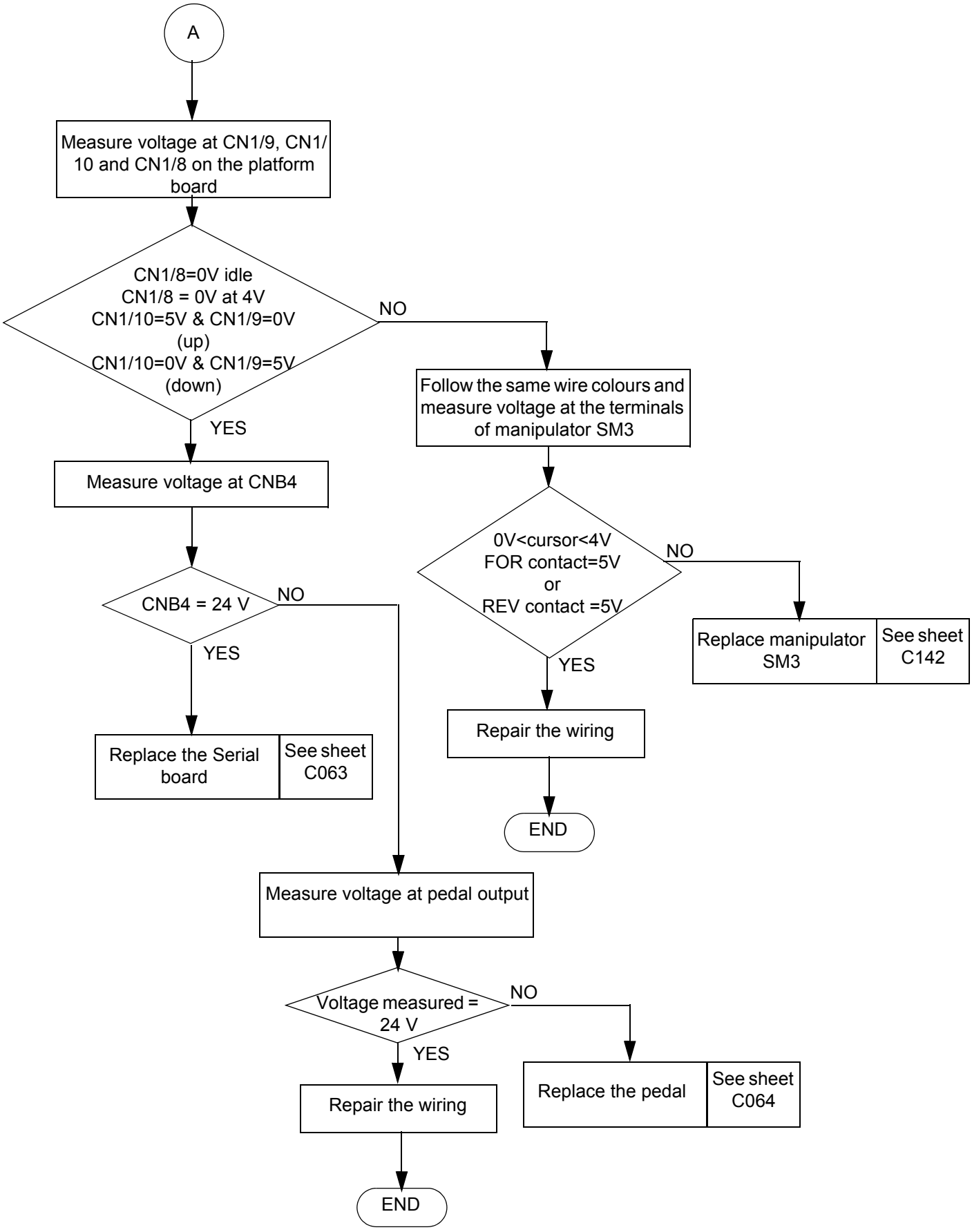


| | | |
|---|---|---|
| Sheet DP076 | BREAKDOWN DETECTION FLOW CHART | Folio 6/6 |
| | NO UP OR DOWN JIB MOVEMENT<br>FROM THE TURNTABLE | |

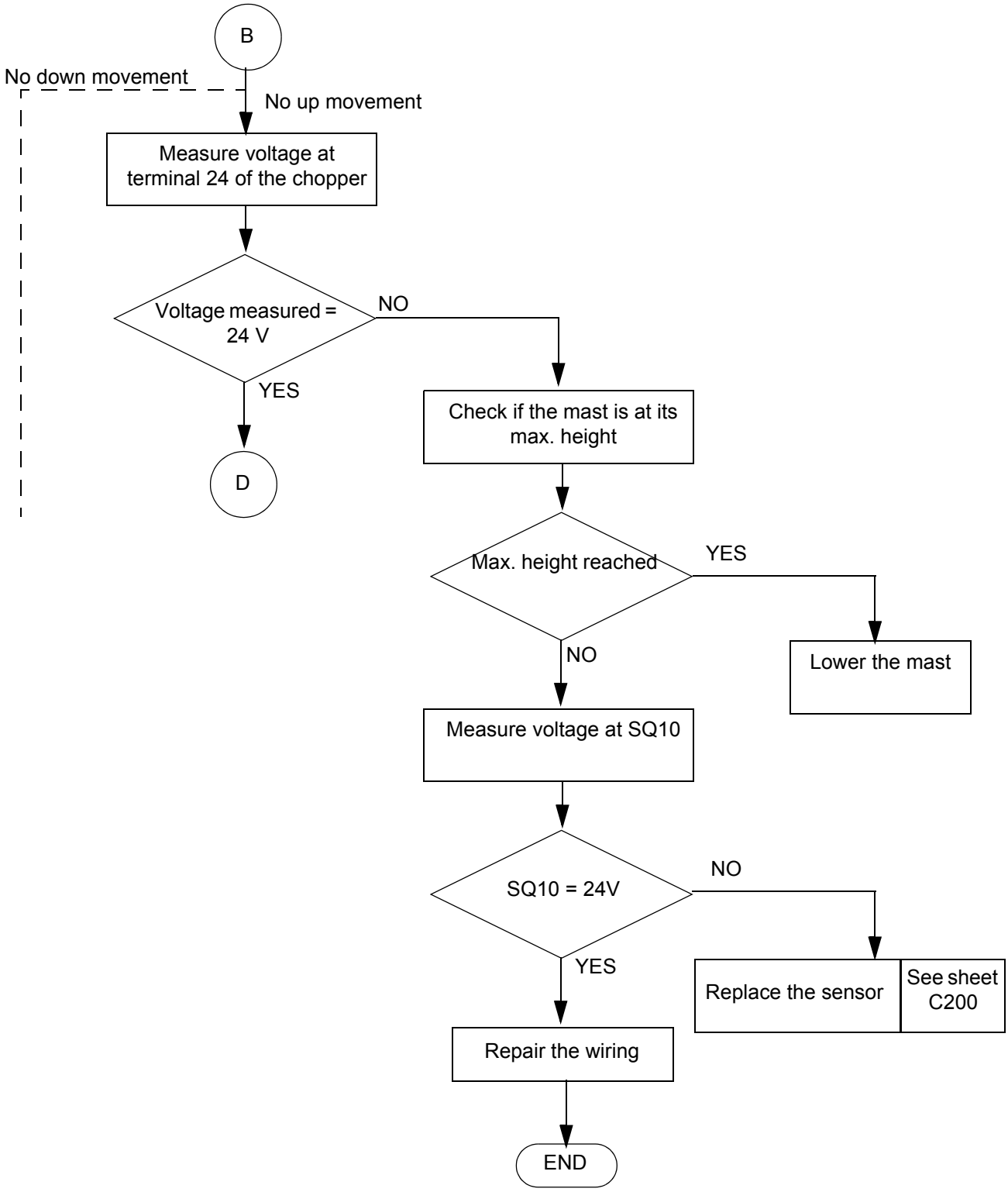
| Sheet DP077 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN MAST MOVEMENT FROM THE PLATFORM | Folio 1/6 |
|---|---|---|


No mast up or down movement from the platform
Put the key switch in the "Turntable" position. Activate mast up/down movement
The mast moves up or down
NO
B
YES
Put the key switch in the "Platform" position. Activate mast up/down movement
Open the "Platform" box and measure voltage on CN23 and CNB6 of the platform board
CN23 = 0V
CNB6 = 0V
NO
YES
A
Measure voltage at the terminals of selector switch SA2
SA2a (29A) = 0V
SA2b = 0V
NO
Replace the selector
See sheet C004
YES
Repair the wiring
END

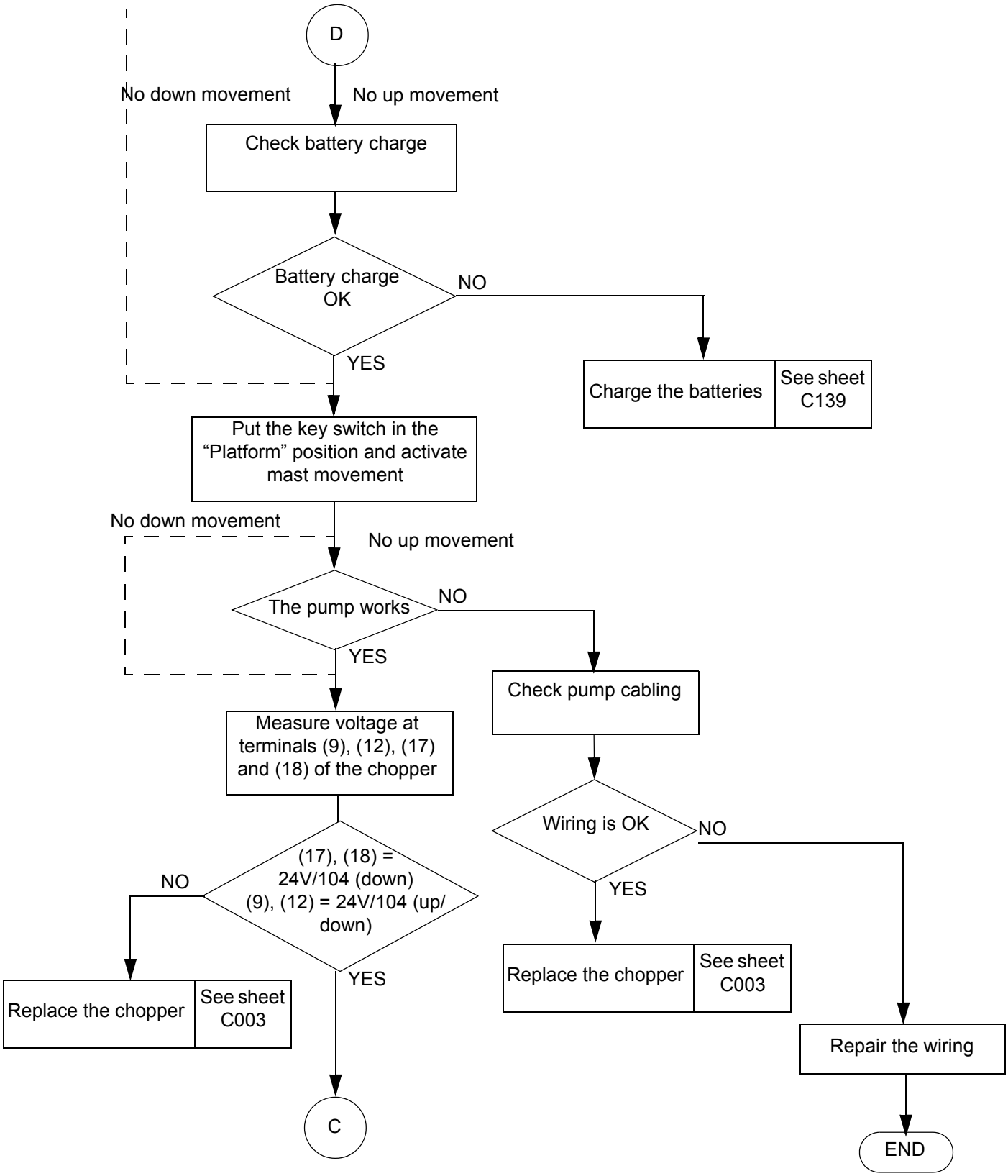
| Sheet DP077 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN MAST MOVEMENT FROM THE PLATFORM | Folio 2/6 |
|---|---|---|



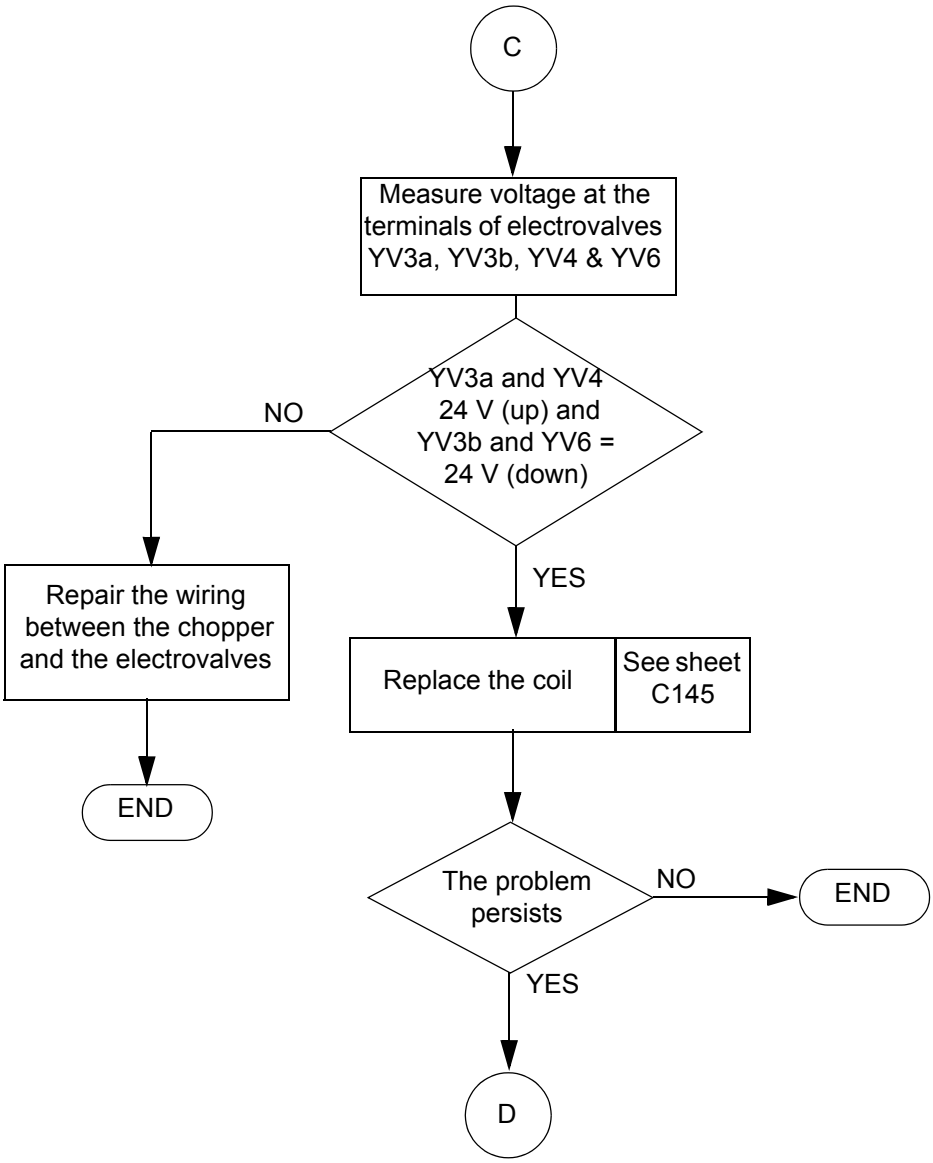
| Sheet DP077 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN MAST MOVEMENT FROM THE PLATFORM | Folio 3/6 |
|---|---|---|



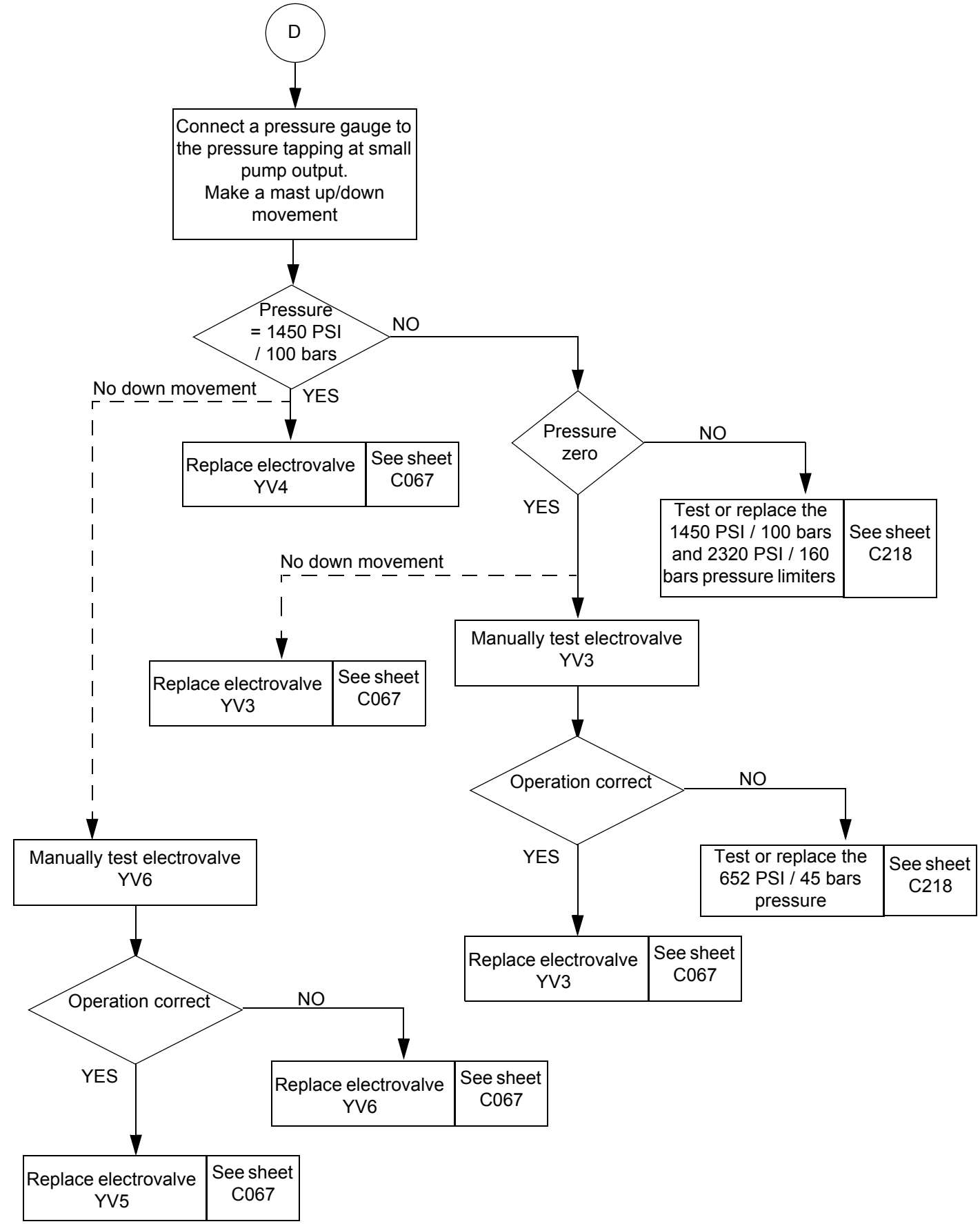
| Sheet DP077 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN MAST MOVEMENT FROM THE PLATFORM | Folio 4/6 |
|---|---|---|



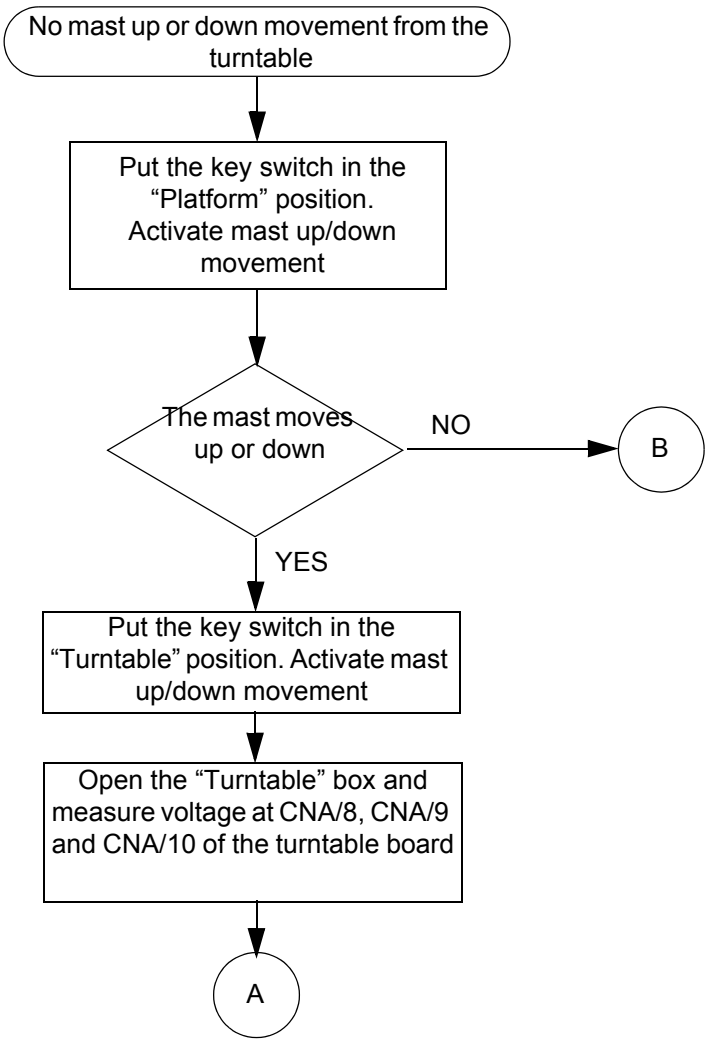
| Sheet DP077 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN MAST MOVEMENT FROM THE PLATFORM | Folio 5/6 |
|---|---|---|



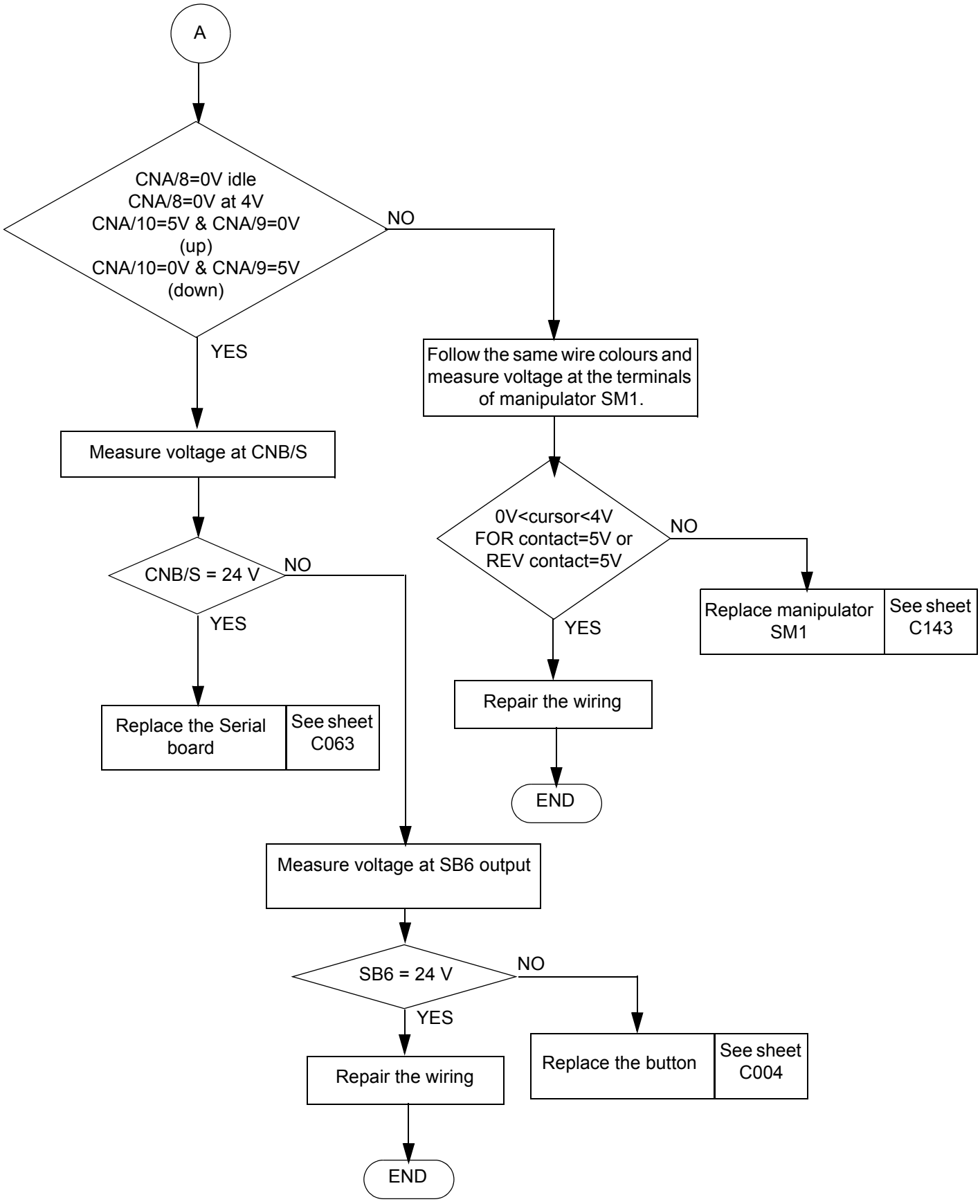
| Sheet DP077 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN MAST MOVEMENT<br>FROM THE PLATFORM | Folio 6/6 |
|---|---|---|



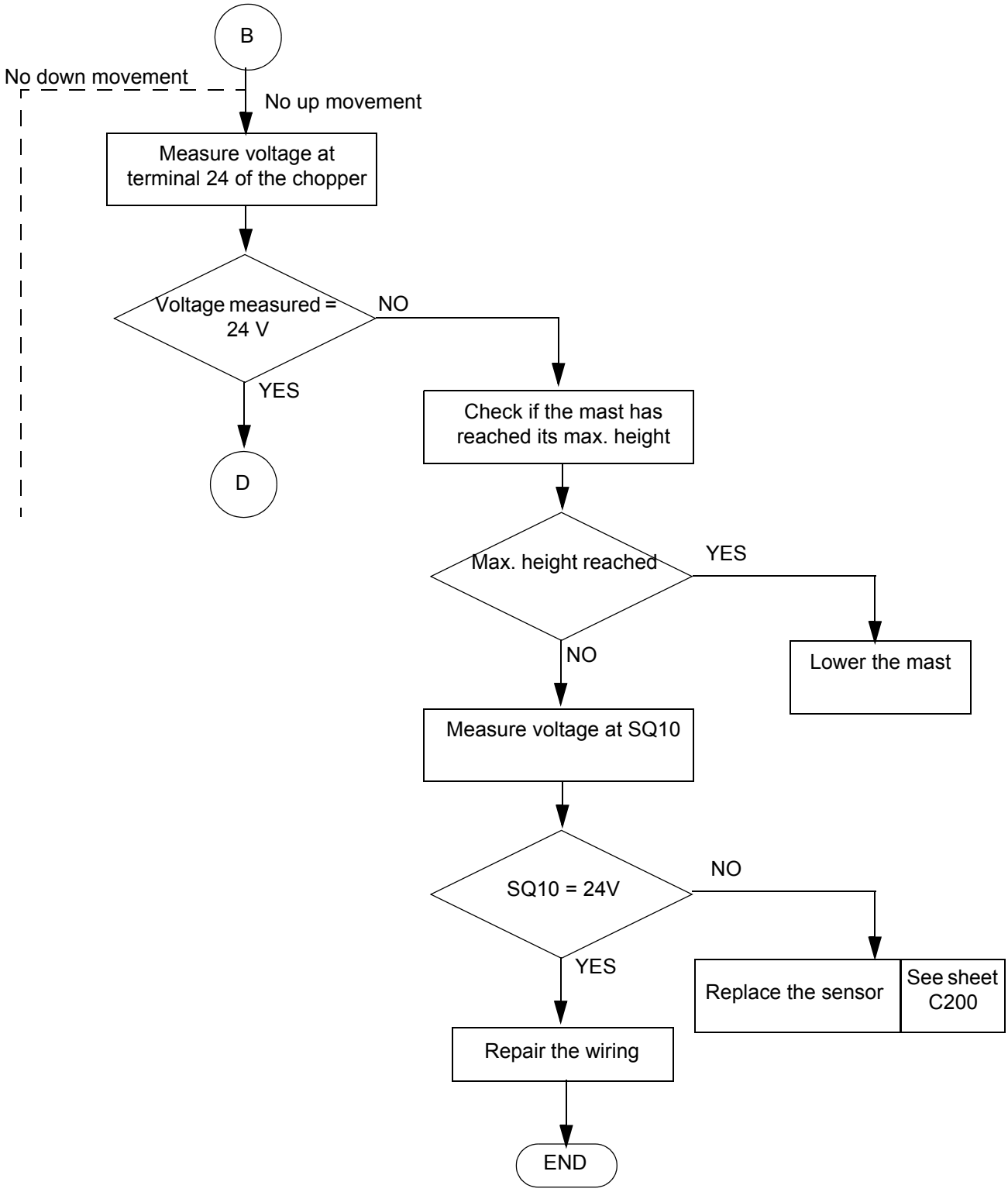
| Sheet DP078 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN MAST MOVEMENT FROM THE TURNTABLE | Folio 1/6 |
|---|---|---|


No mast up or down movement from the turntable
Put the key switch in the “Platform” position. Activate mast up/down movement
The mast moves up or down
NO
B
YES
Put the key switch in the “Turntable” position. Activate mast up/down movement
Open the “Turntable” box and measure voltage at CNA/8, CNA/9 and CNA/10 of the turntable board
A

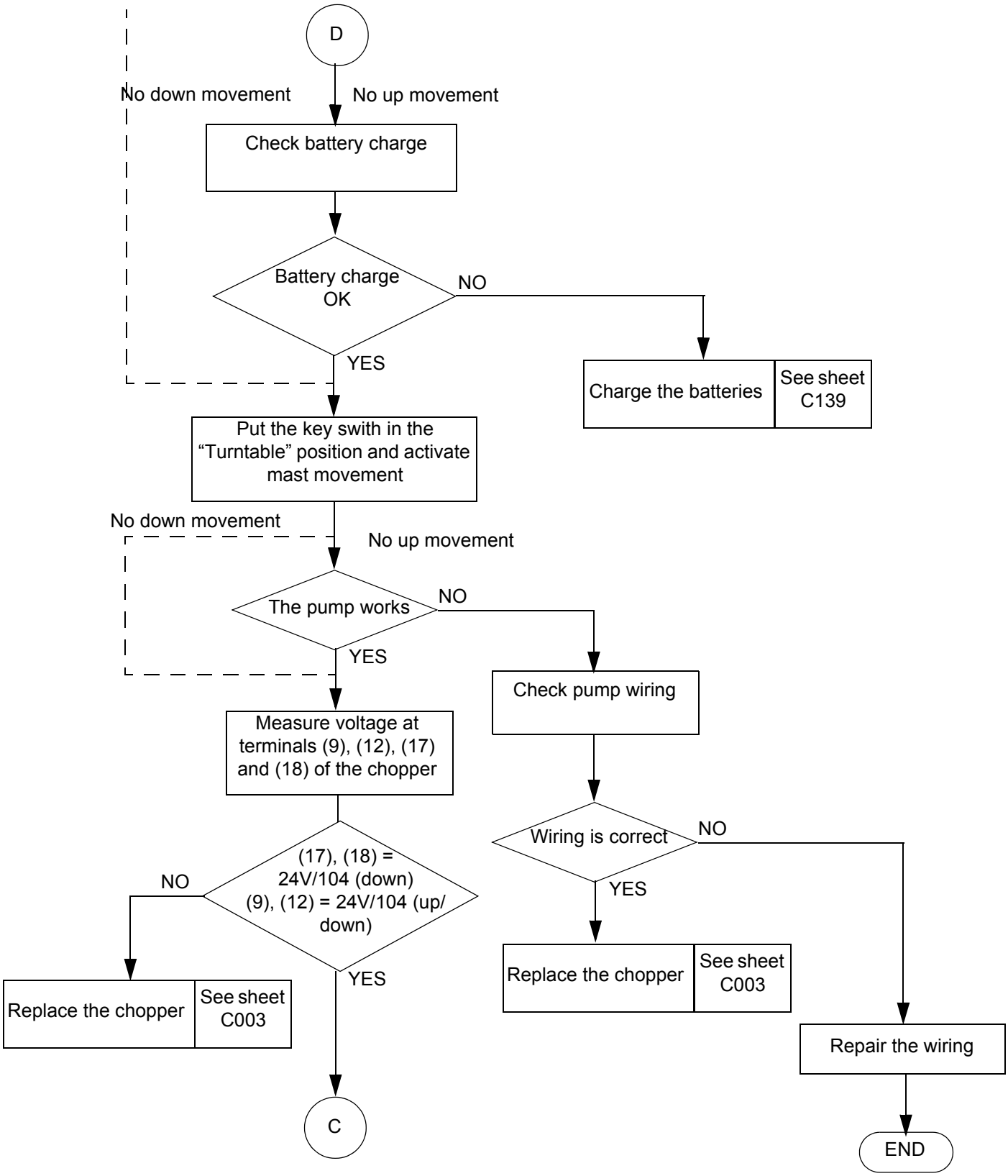
| Sheet DP078 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN MAST MOVEMENT FROM THE TURNTABLE | Folio 2/6 |
|---|---|---|



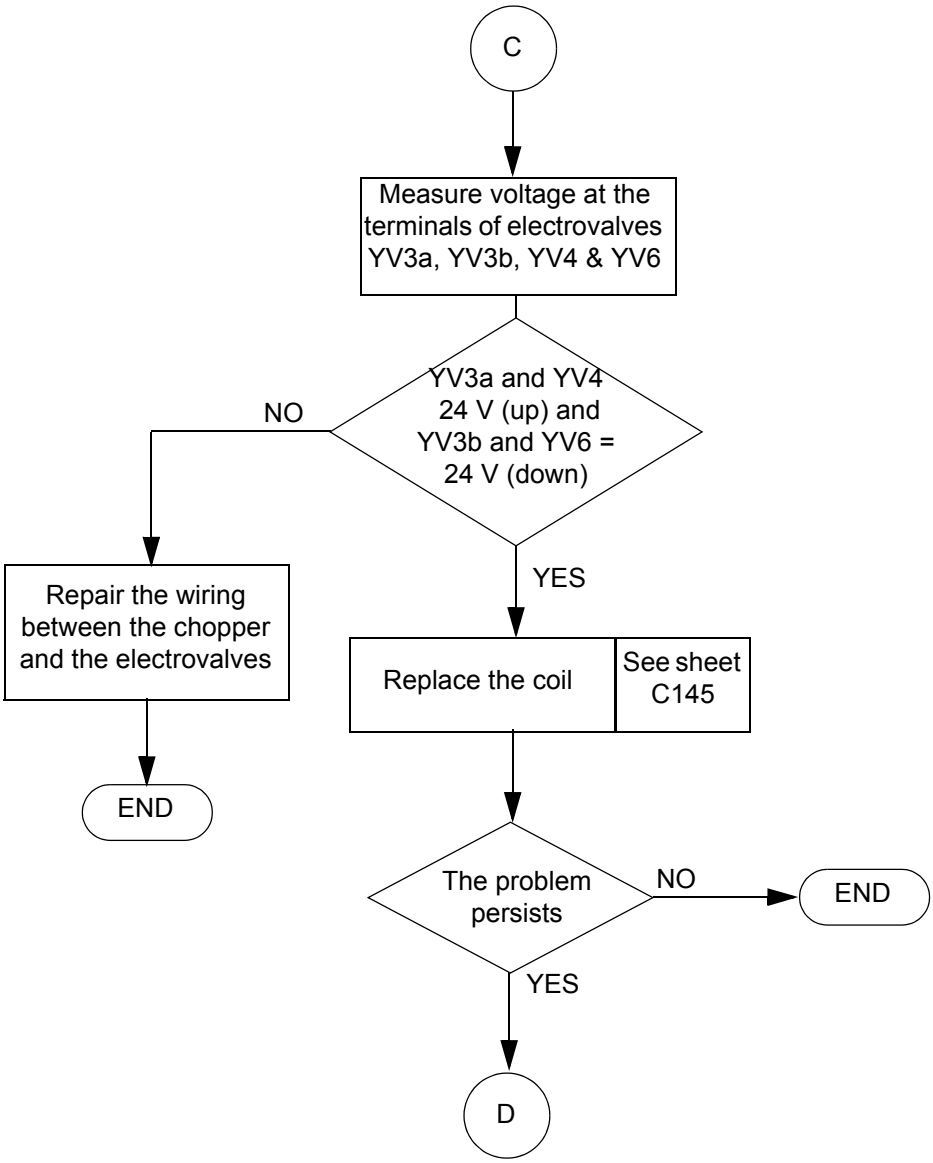
| Sheet DP078 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN MAST MOVEMENT FROM THE TURNTABLE | Folio 3/6 |
|---|---|---|



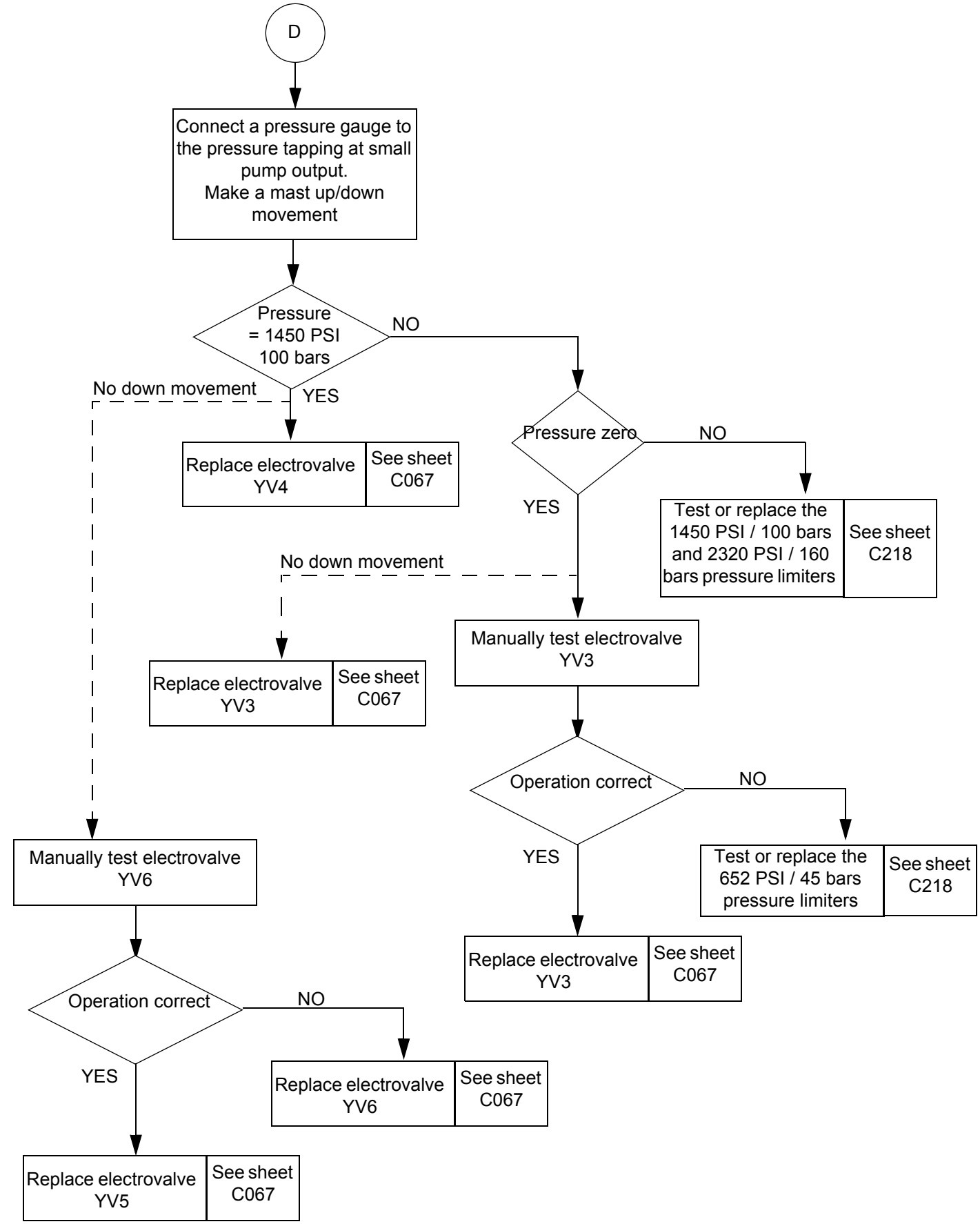
| Sheet DP078 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN MAST MOVEMENT FROM THE TURNTABLE | Folio 4/6 |
|---|---|---|



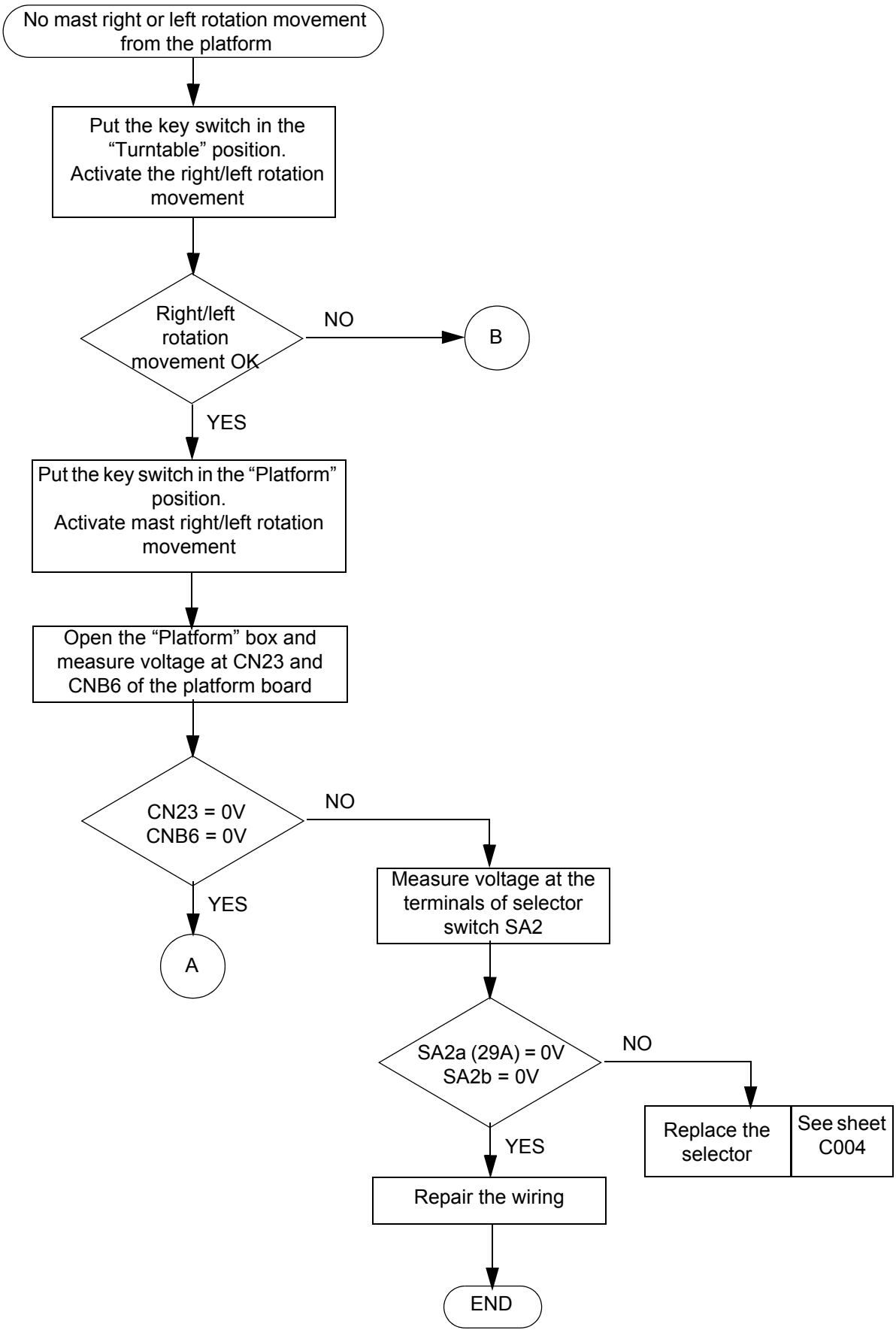
| Sheet DP078 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN MAST MOVEMENT FROM THE TURNTABLE | Folio 5/6 |
|---|---|---|



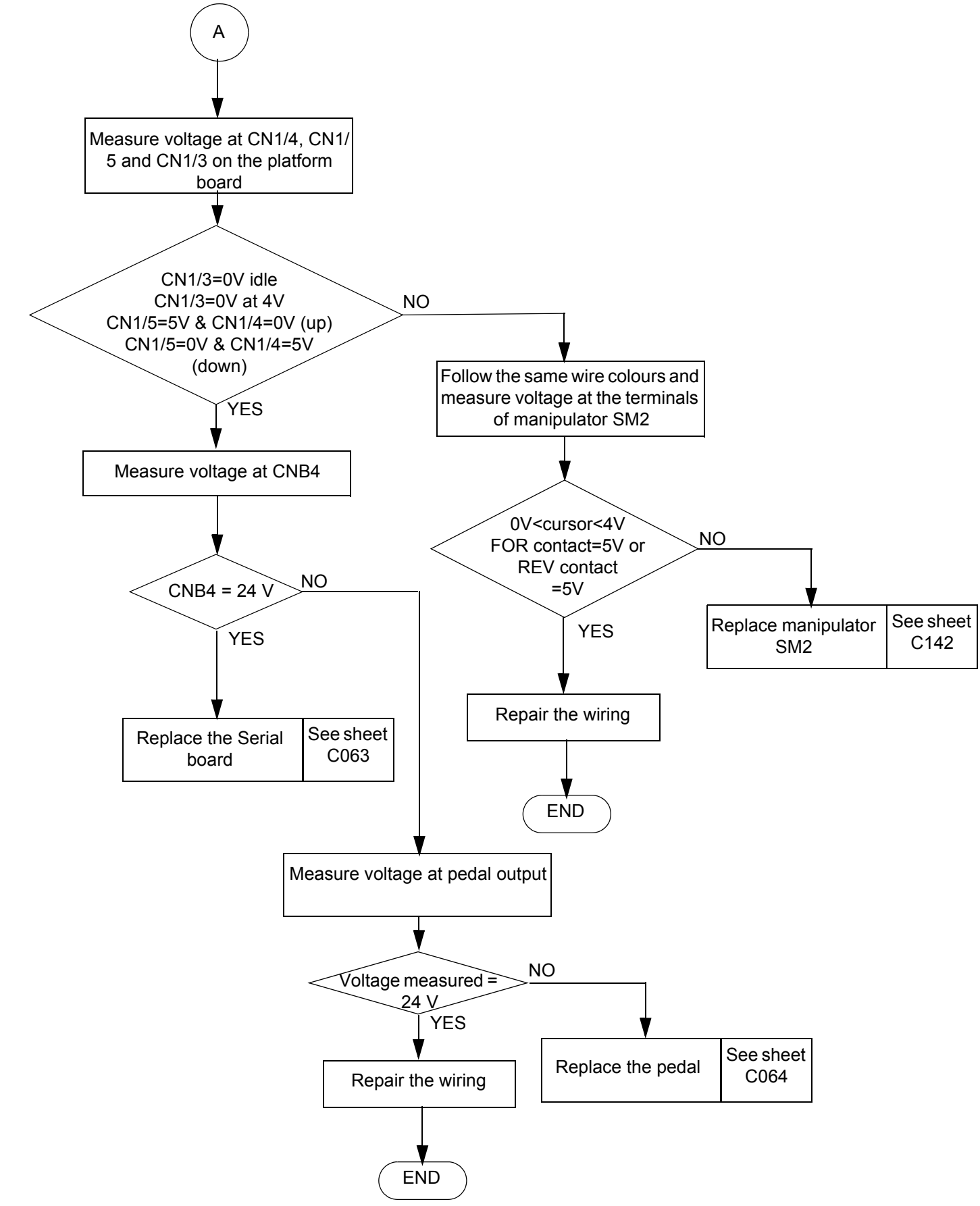
| Sheet DP078 | BREAKDOWN DETECTION FLOW CHART<br>NO UP OR DOWN MAST MOVEMENT FROM THE TURNTABLE | Folio 6/6 |
|---|---|---|



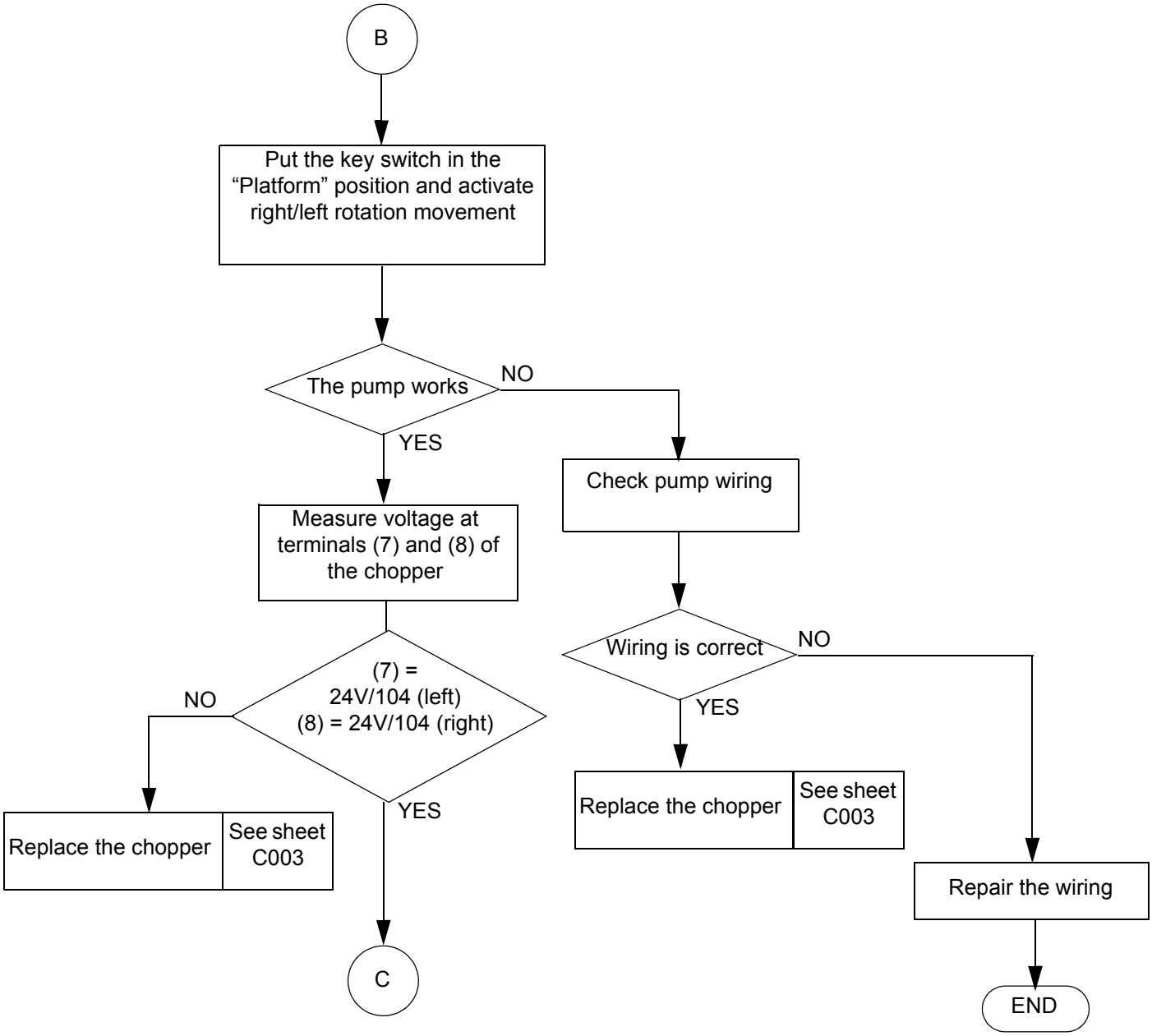
| Sheet DP079 | BREAKDOWN DETECTION FLOW CHART<br>NO RIGHT OR LEFT ROTATIONAL MAST MOVEMENT FROM THE PLATFORM | Folio 1/6 |
|---|---|---|


No mast right or left rotation movement from the platform
Put the key switch in the "Turntable" position. Activate the right/left rotation movement
Right/left rotation movement OK
NO
B
YES
Put the key switch in the "Platform" position. Activate mast right/left rotation movement
Open the "Platform" box and measure voltage at CN23 and CNB6 of the platform board
CN23 = 0V CNB6 = 0V
NO
YES
A
Measure voltage at the terminals of selector switch SA2
SA2a (29A) = 0V SA2b = 0V
NO
YES
Replace the selector
See sheet C004
Repair the wiring
END

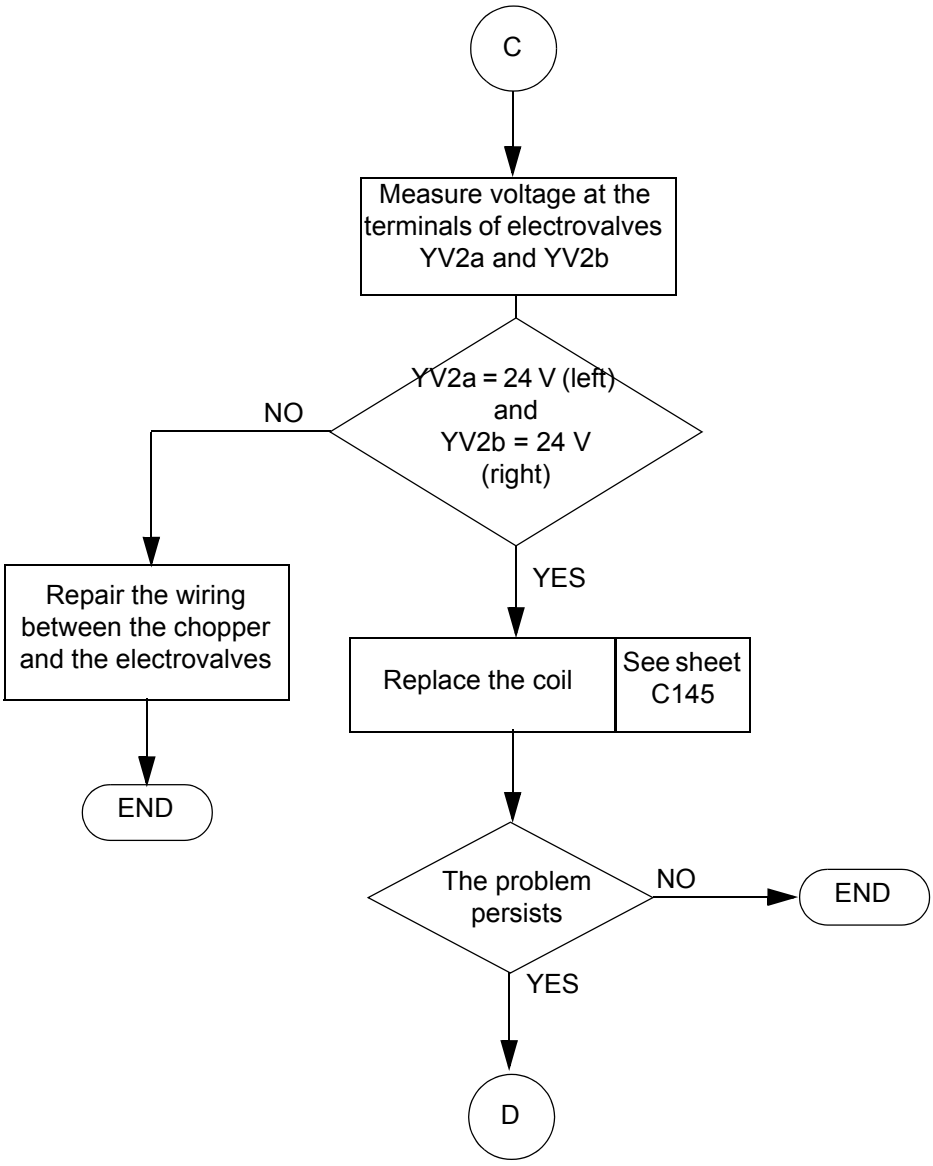
| Sheet DP079 | BREAKDOWN DETECTION FLOW CHART<br>NO RIGHT OR LEFT ROTATIONAL MAST MOVEMENT FROM THE PLATFORM | Folio 2/6 |
|---|---|---|



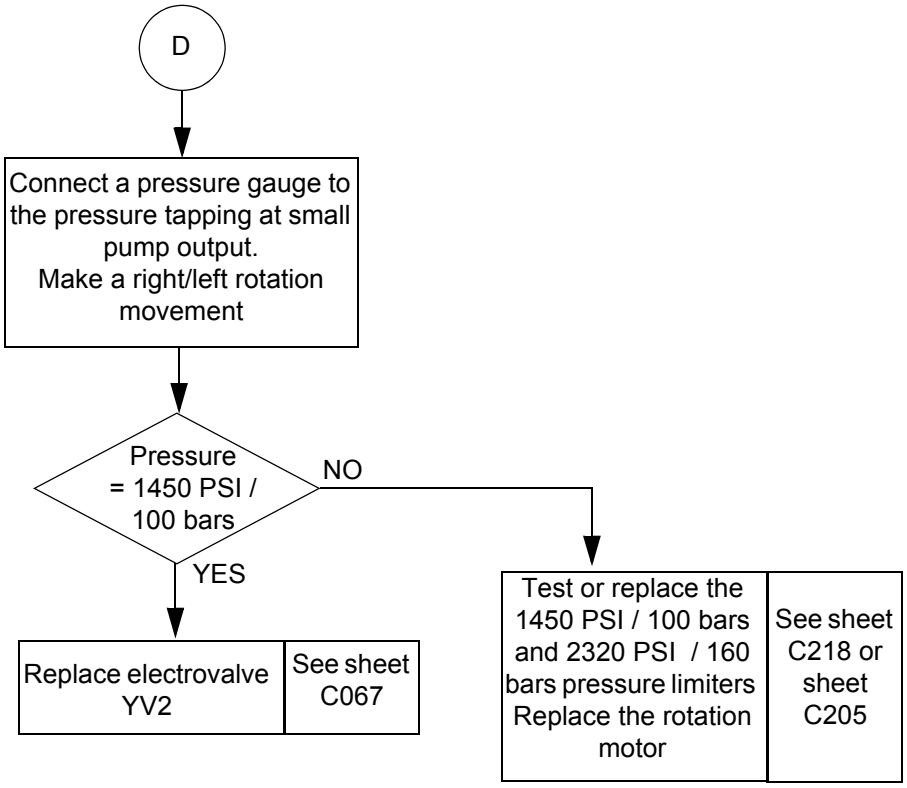
| Sheet DP079 | BREAKDOWN DETECTION FLOW CHART<br>NO RIGHT OR LEFT ROTATIONAL MAST MOVEMENT FROM THE PLATFORM | Folio 3/6 |
|---|---|---|



| Sheet DP079 | BREAKDOWN DETECTION FLOW CHART<br>NO RIGHT OR LEFT ROTATIONAL MAST MOVEMENT FROM THE PLATFORM | Folio 4/6 |
|---|---|---|

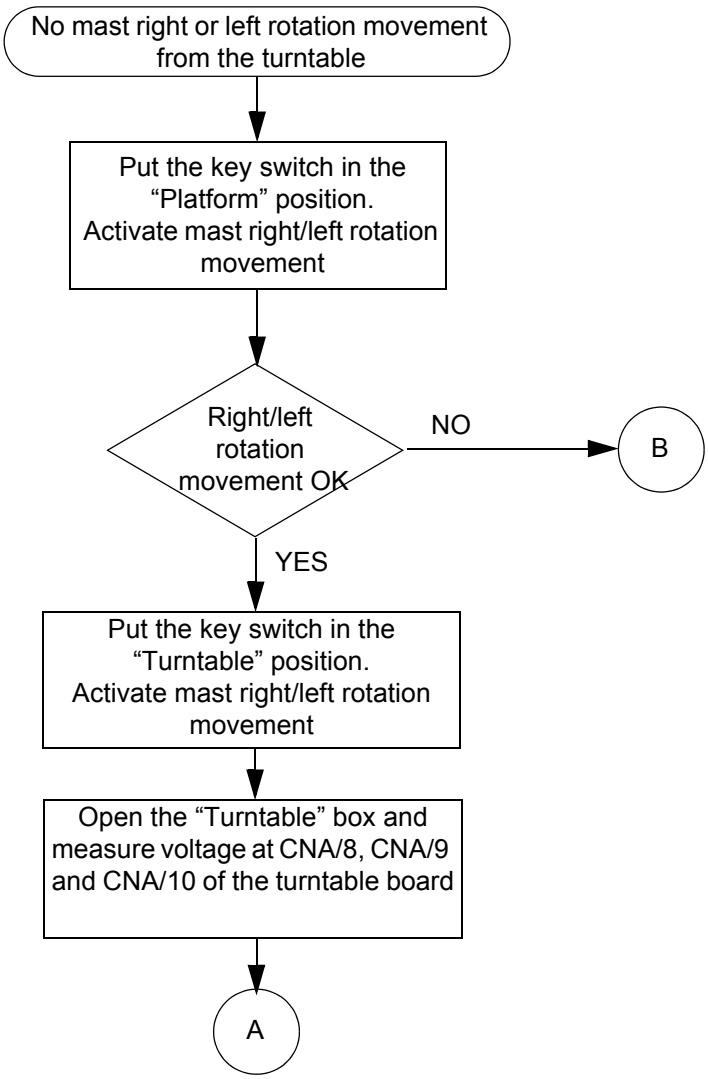


| Sheet DP079 | BREAKDOWN DETECTION FLOW CHART<br>NO RIGHT OR LEFT ROTATIONAL MAST MOVEMENT FROM THE PLATFORM | Folio 5/6 |
|---|---|---|

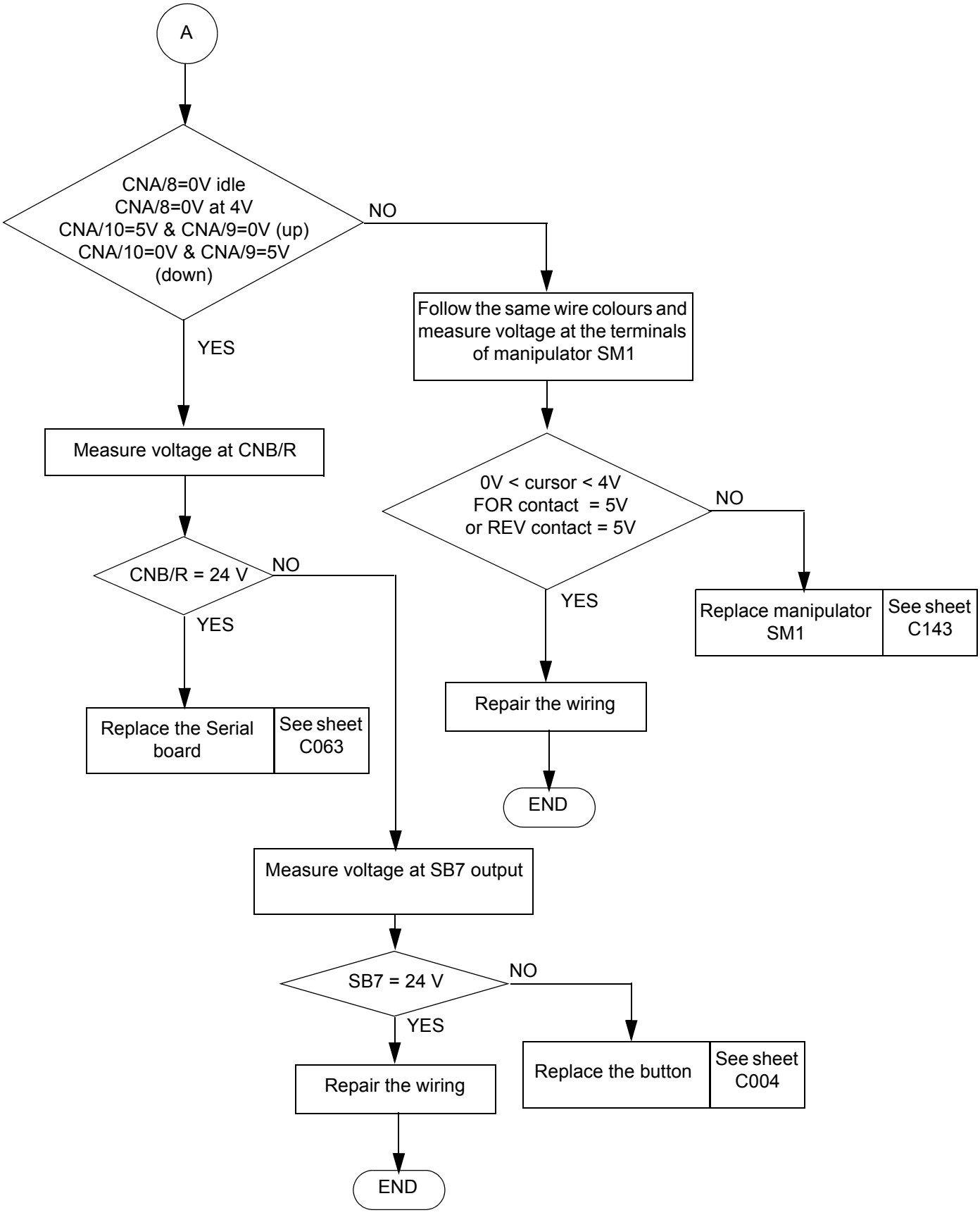

D
Connect a pressure gauge to the pressure tapping at small pump output.
Make a right/left rotation movement
Pressure = 1450 PSI / 100 bars
NO
YES
Replace electrovalve YV2
See sheet C067
Test or replace the 1450 PSI / 100 bars and 2320 PSI / 160 bars pressure limiters
Replace the rotation motor
See sheet C218 or sheet C205

| | | |
|---|---|---|
| Sheet DP079 | BREAKDOWN DETECTION FLOW CHART | Folio 6/6 |
| | NO RIGHT OR LEFT ROTATIONAL MAST MOVEMENT FROM THE PLATFORM | |

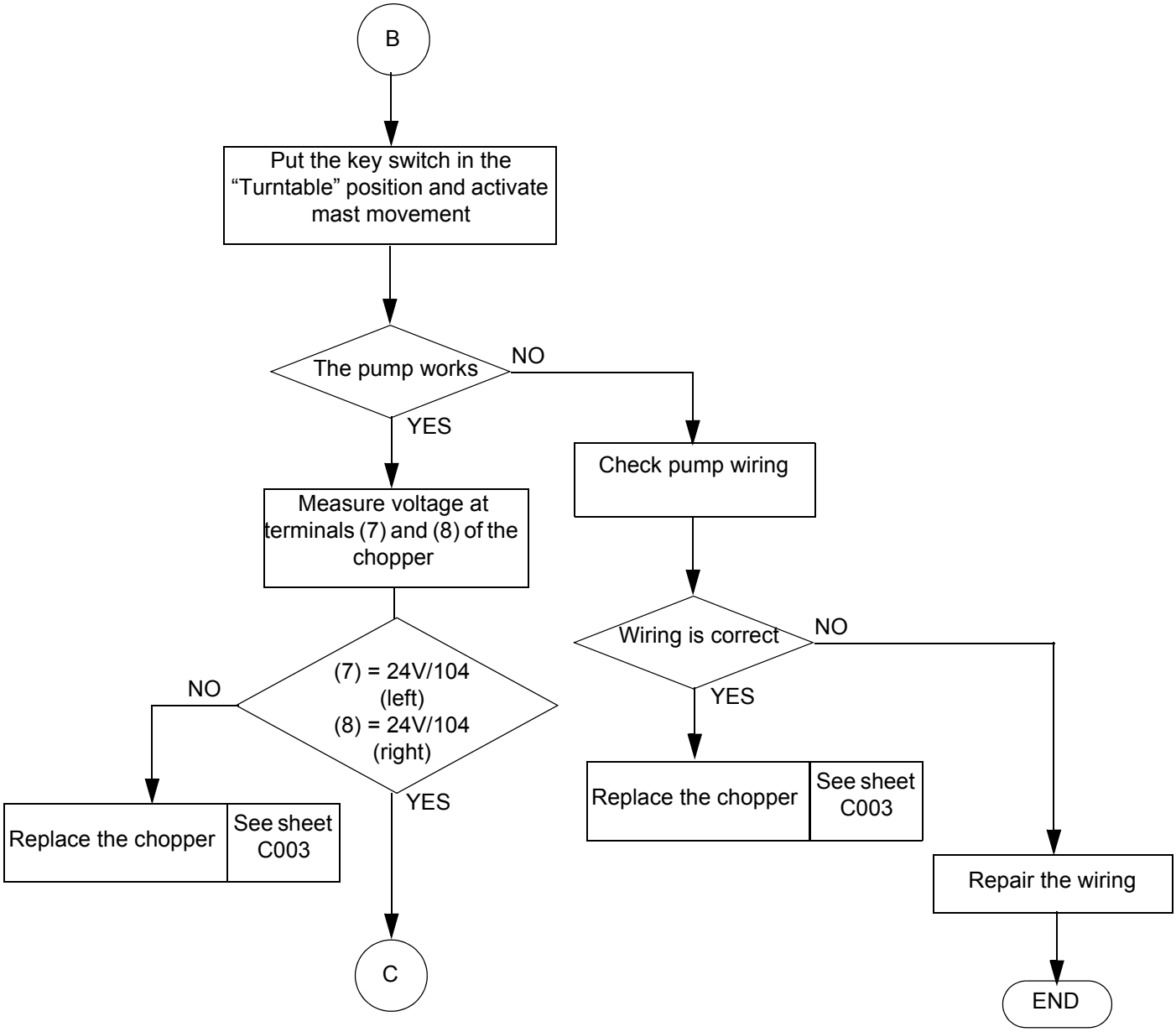
| Sheet DP080 | BREAKDOWN DETECTION FLOW CHART<br>NO RIGHT OR LEFT ROTATIONAL MAST MOVEMENT FROM THE TURNTABLE | Folio 1/6 |
|---|---|---|


No mast right or left rotation movement from the turntable
Put the key switch in the "Platform" position. Activate mast right/left rotation movement
Right/left rotation movement OK
NO
B
YES
Put the key switch in the "Turntable" position. Activate mast right/left rotation movement
Open the "Turntable" box and measure voltage at CNA/8, CNA/9 and CNA/10 of the turntable board
A

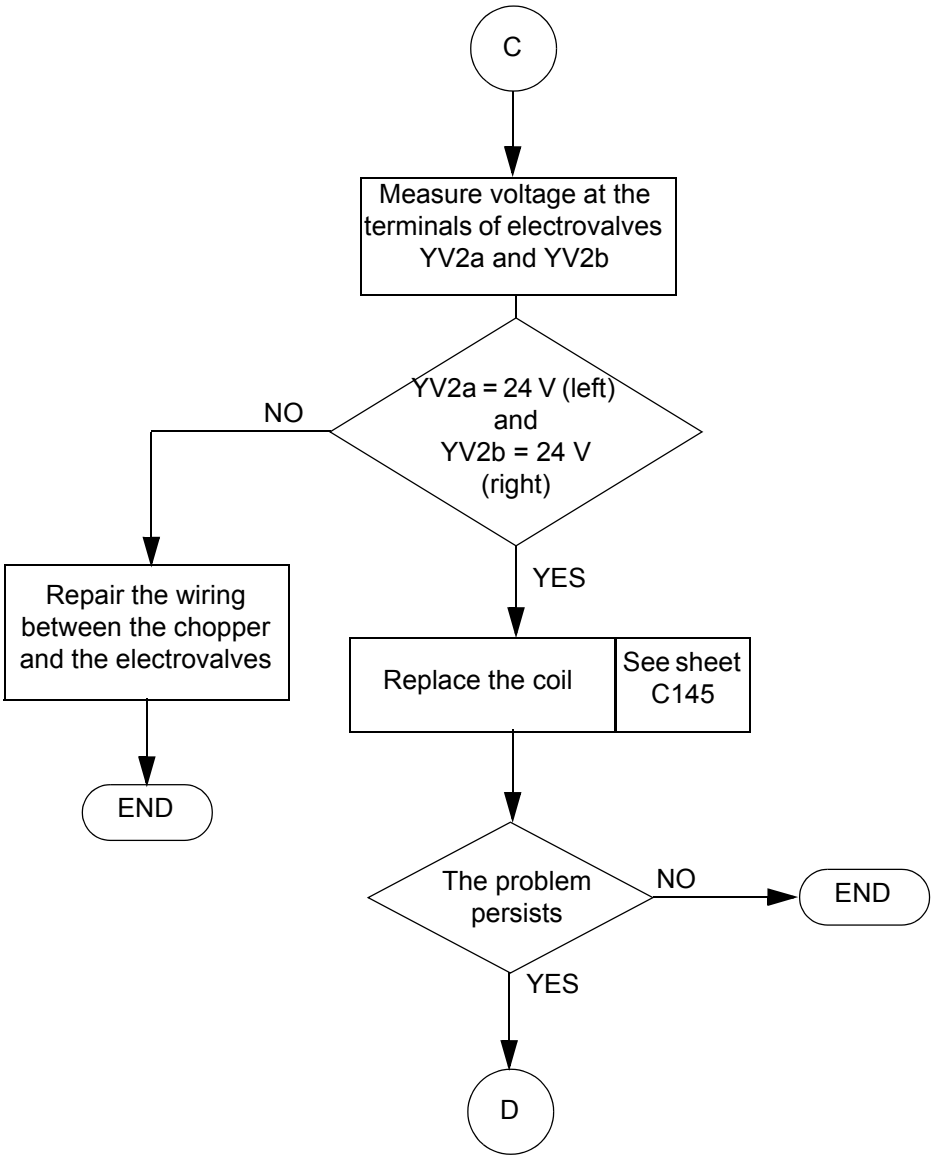
| Sheet DP080 | BREAKDOWN DETECTION FLOW CHART<br>NO RIGHT OR LEFT ROTATIONAL MAST MOVEMENT FROM THE TURNTABLE | Folio 2/6 |
|---|---|---|



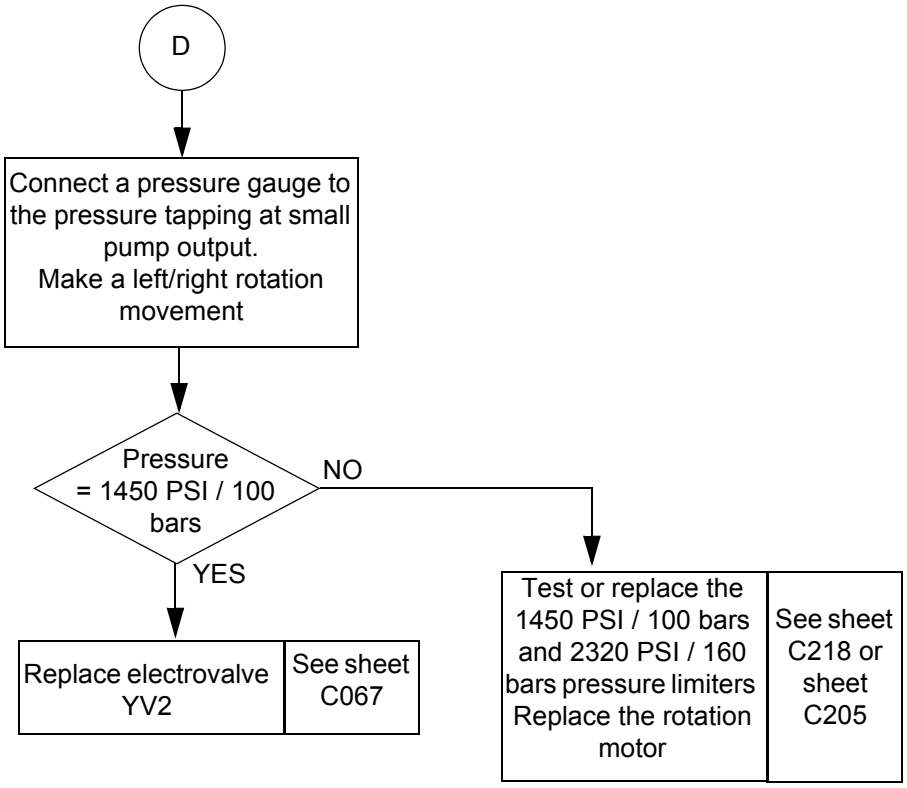
| Sheet DP080 | BREAKDOWN DETECTION FLOW CHART<br>NO RIGHT OR LEFT ROTATIONAL MAST MOVEMENT FROM THE TURNTABLE | Folio 3/6 |
|---|---|---|



| Sheet DP080 | BREAKDOWN DETECTION FLOW CHART<br>NO RIGHT OR LEFT ROTATIONAL MAST MOVEMENT FROM THE TURNTABLE | Folio 4/6 |
|---|---|---|

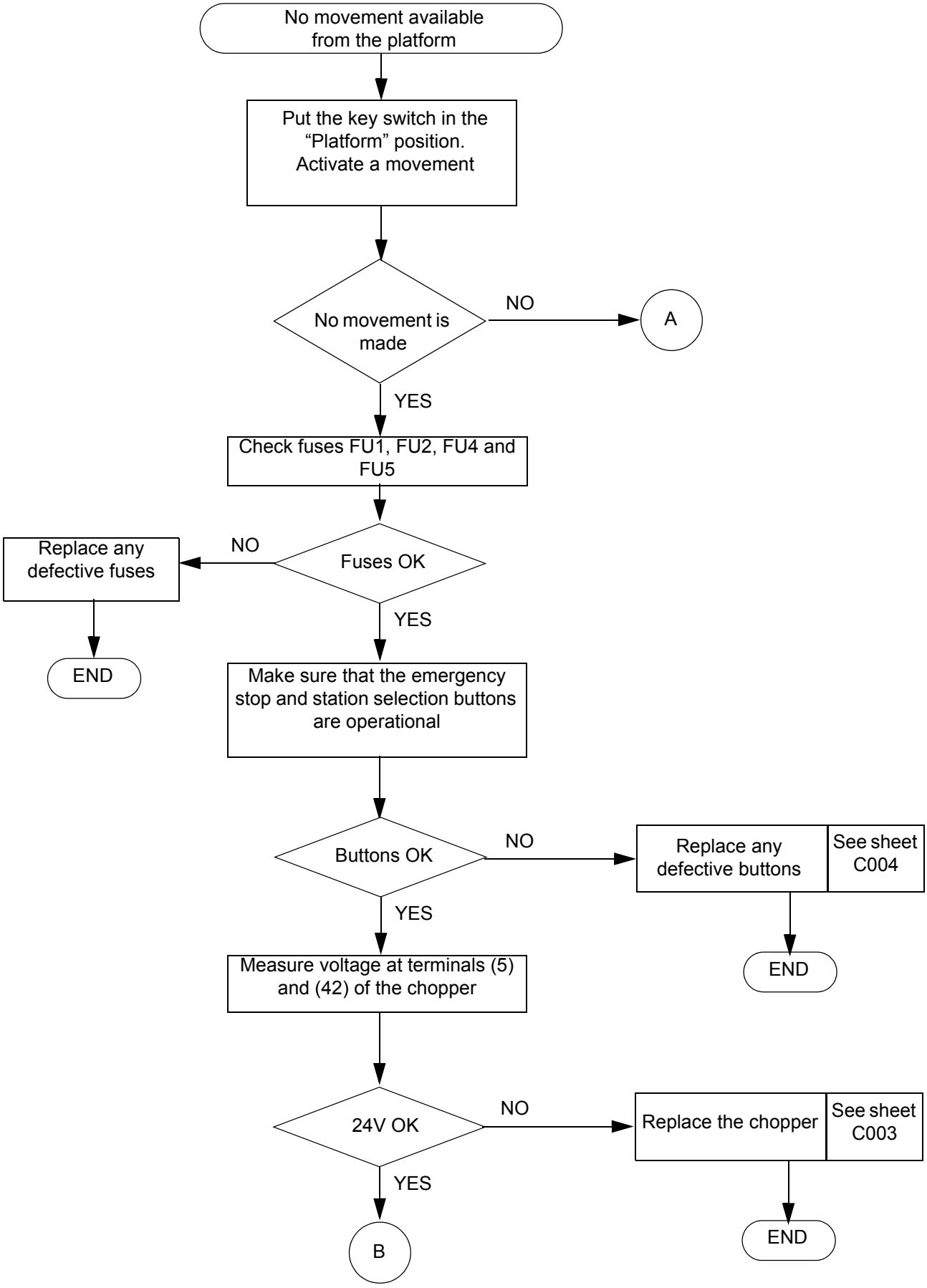


| Sheet DP080 | BREAKDOWN DETECTION FLOW CHART<br>NO RIGHT OR LEFT ROTATIONAL MAST MOVEMENT FROM THE TURNTABLE | Folio 5/6 |
|---|---|---|

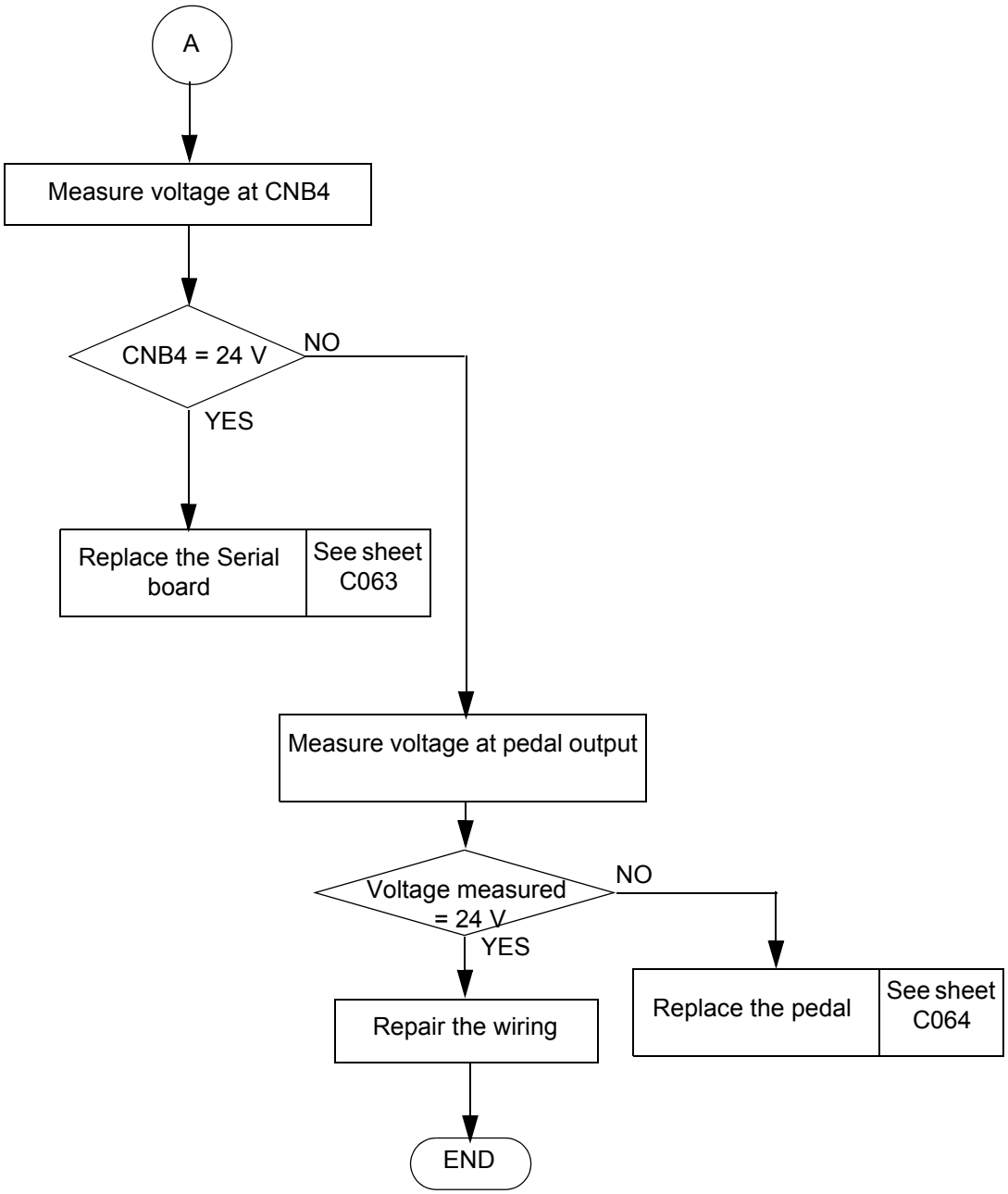

D
Connect a pressure gauge to the pressure tapping at small pump output.
Make a left/right rotation movement
Pressure = 1450 PSI / 100 bars
NO
YES
Replace electrovalve YV2
See sheet C067
Test or replace the 1450 PSI / 100 bars and 2320 PSI / 160 bars pressure limiters
Replace the rotation motor
See sheet C218 or sheet C205

| | | |
|---|---|---|
| Sheet DP080 | BREAKDOWN DETECTION FLOW CHART | Folio 6/6 |
| | NO RIGHT OR LEFT ROTATIONAL MAST MOVEMENT FROM THE TURNTABLE | |

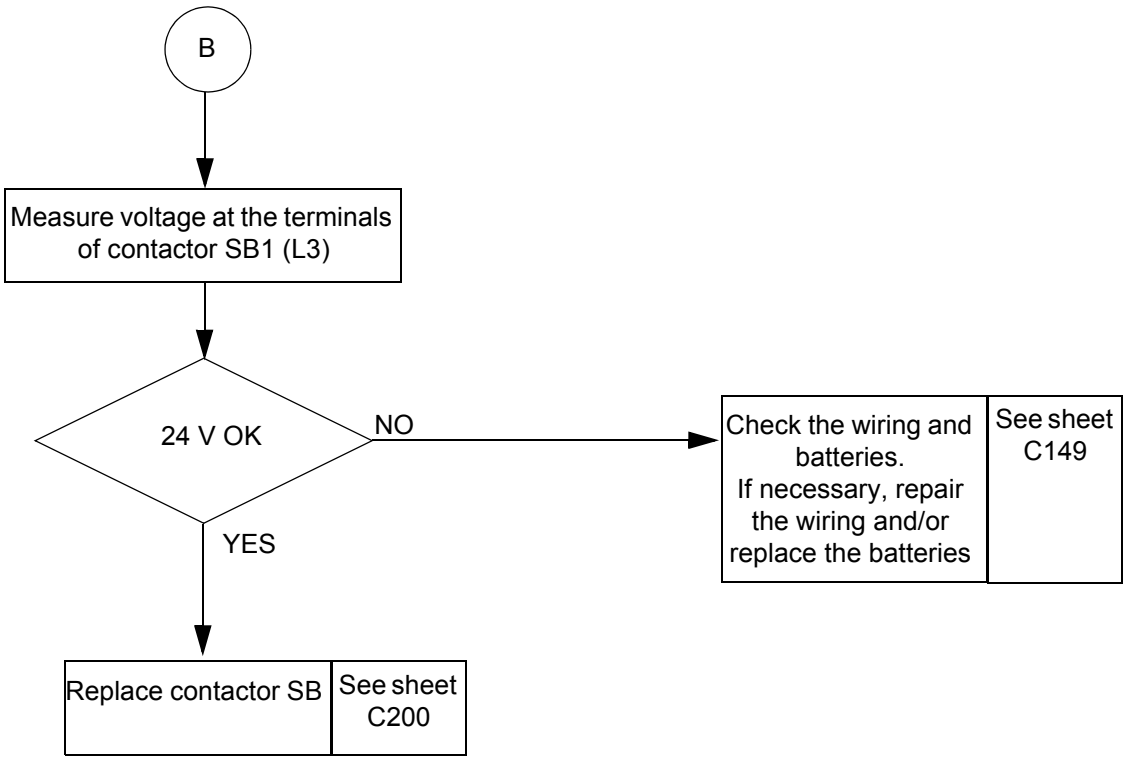
| Sheet DP081 | BREAKDOWN DETECTION FLOW CHART<br>NO MOVEMENT AVAILABLE FROM THE PLATFORM | Folio 1/4 |
|---|---|---|



| Sheet DP081 | BREAKDOWN DETECTION FLOW CHART<br>NO MOVEMENT AVAILABLE FROM THE PLATFORM | Folio 2/4 |
|---|---|---|

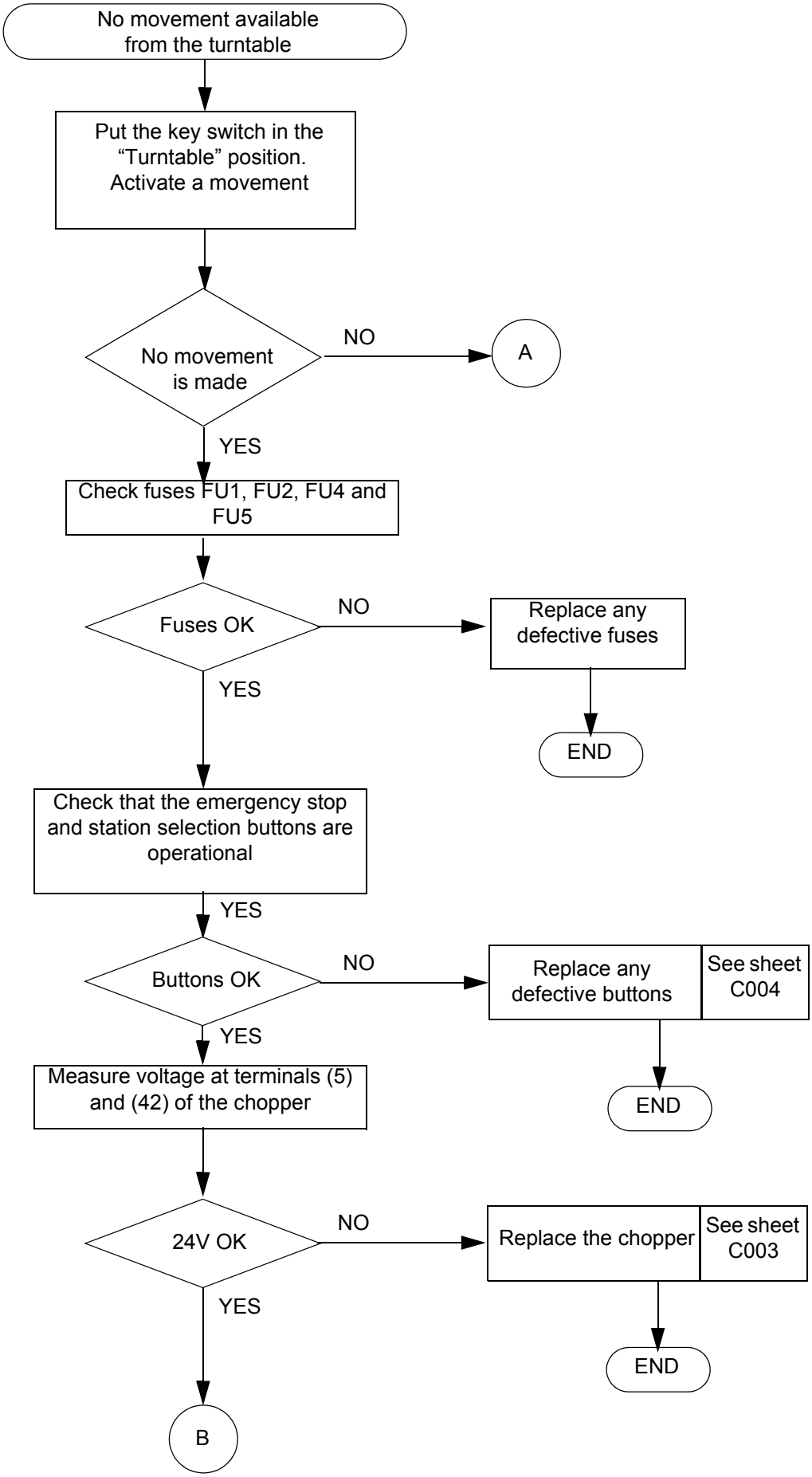


| Sheet DP081 | BREAKDOWN DETECTION FLOW CHART<br>NO MOVEMENT AVAILABLE FROM THE PLATFORM | Folio 3/4 |
|---|---|---|

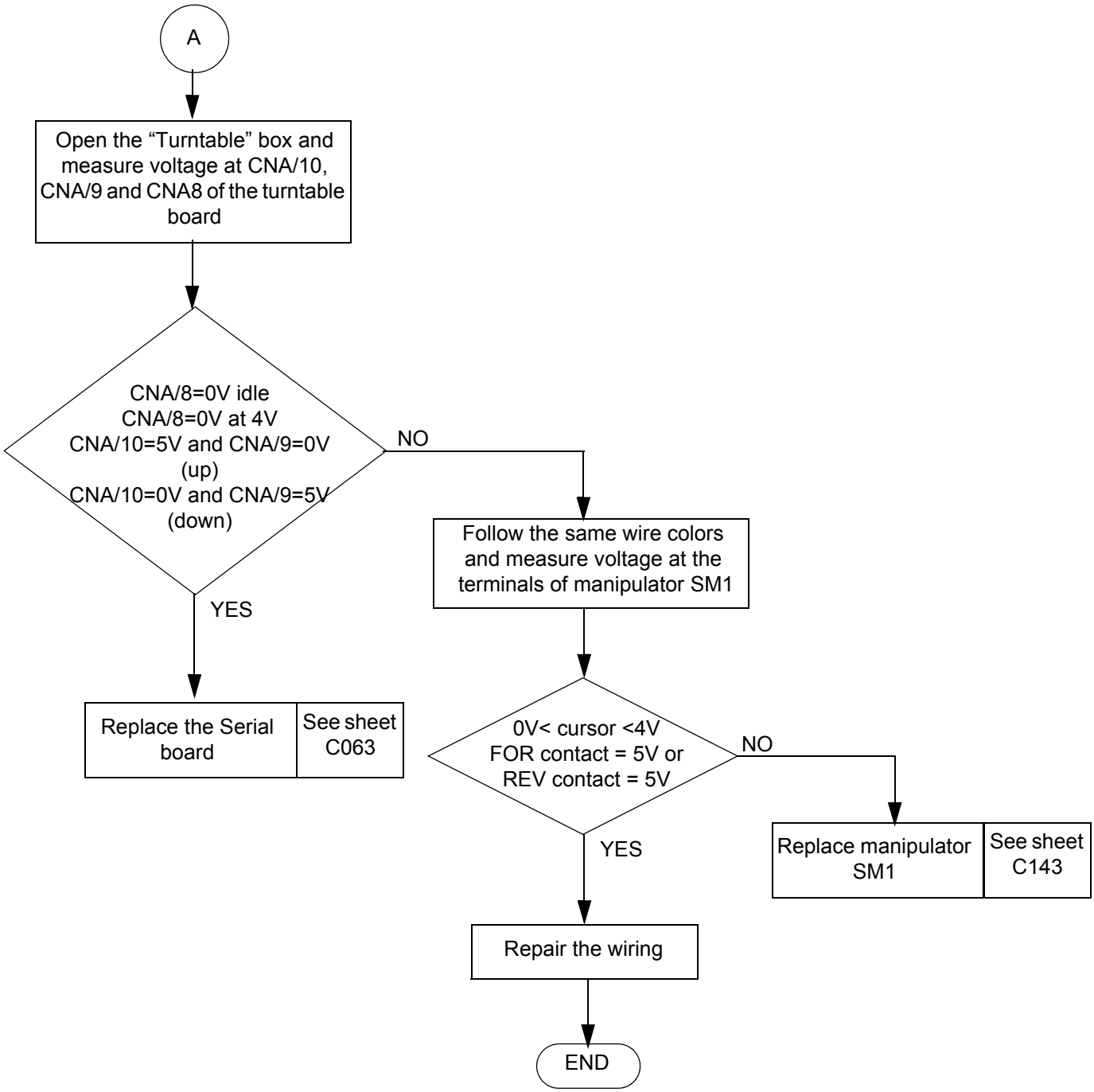

B
Measure voltage at the terminals of contactor SB1 (L3)
24 V OK
NO
Check the wiring and batteries. If necessary, repair the wiring and/or replace the batteries
See sheet C149
YES
Replace contactor SB
See sheet C200

| | | |
|---|---|---|
| Sheet DP081 | BREAKDOWN DETECTION FLOW CHART | Folio 4/4 |
| | NO MOVEMENT AVAILABLE FROM THE PLATFORM | |

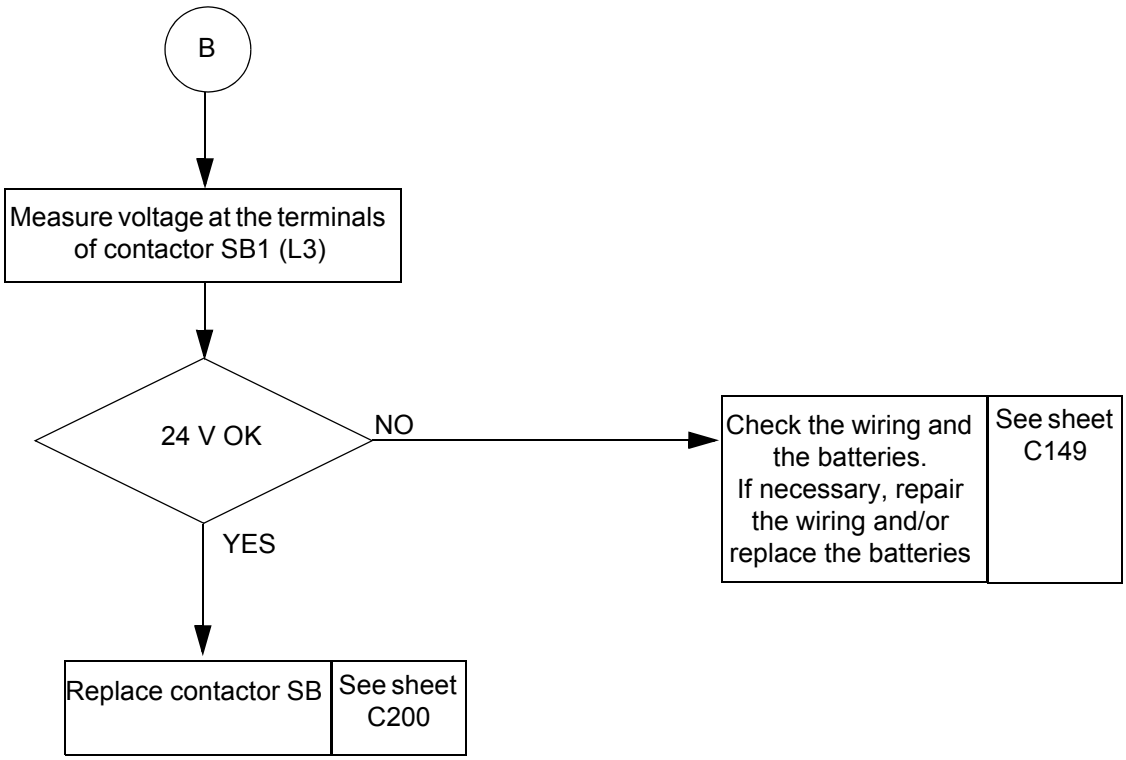
| Sheet DP082 | BREAKDOWN DETECTION FLOW CHART<br>NO MOVEMENT AVAILABLE FROM THE TURNTABLE | Folio 1/4 |
|---|---|---|



| Sheet DP082 | BREAKDOWN DETECTION FLOW CHART<br>NO MOVEMENT AVAILABLE FROM THE TURNTABLE | Folio 2/4 |
|---|---|---|

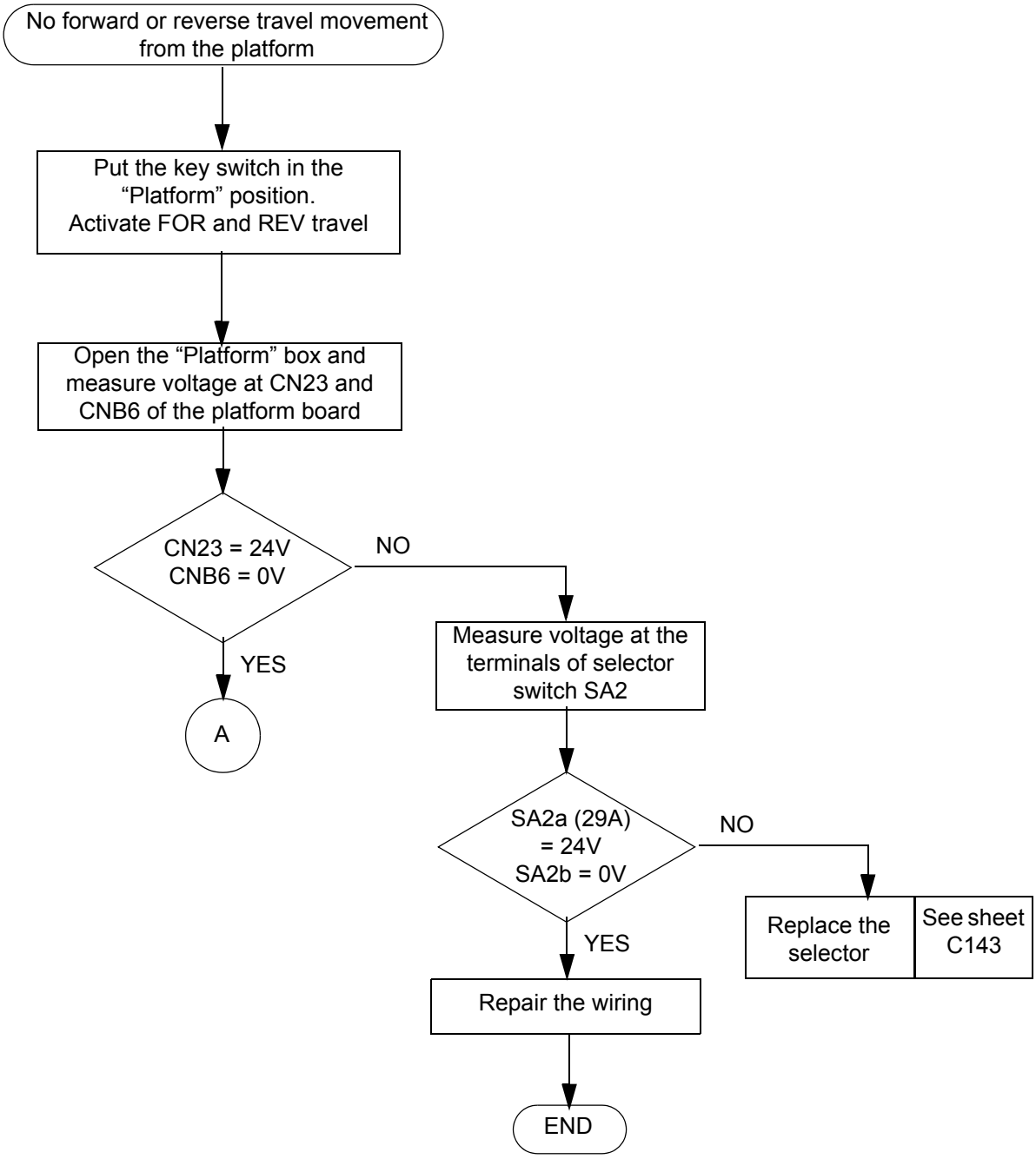


| Sheet DP082 | BREAKDOWN DETECTION FLOW CHART<br>NO MOVEMENT AVAILABLE FROM THE TURNTABLE | Folio 3/4 |
|---|---|---|

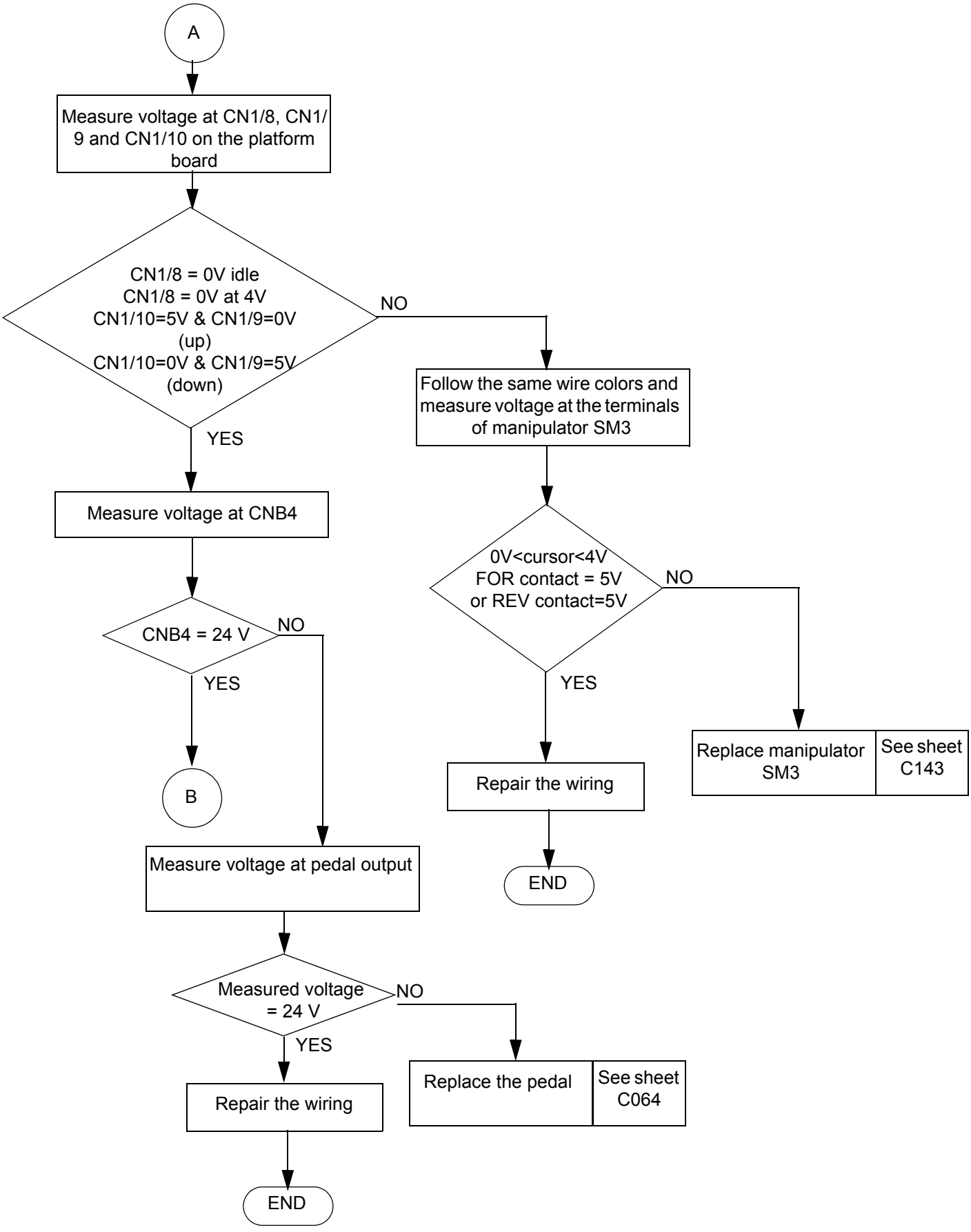

B
Measure voltage at the terminals of contactor SB1 (L3)
24 V OK
NO
Check the wiring and the batteries. If necessary, repair the wiring and/or replace the batteries
See sheet C149
YES
Replace contactor SB
See sheet C200

| | | |
|---|---|---|
| Sheet DP082 | BREAKDOWN DETECTION FLOW CHART<br>NO MOVEMENT AVAILABLE FROM THE TURNTABLE | Folio 4/4 |

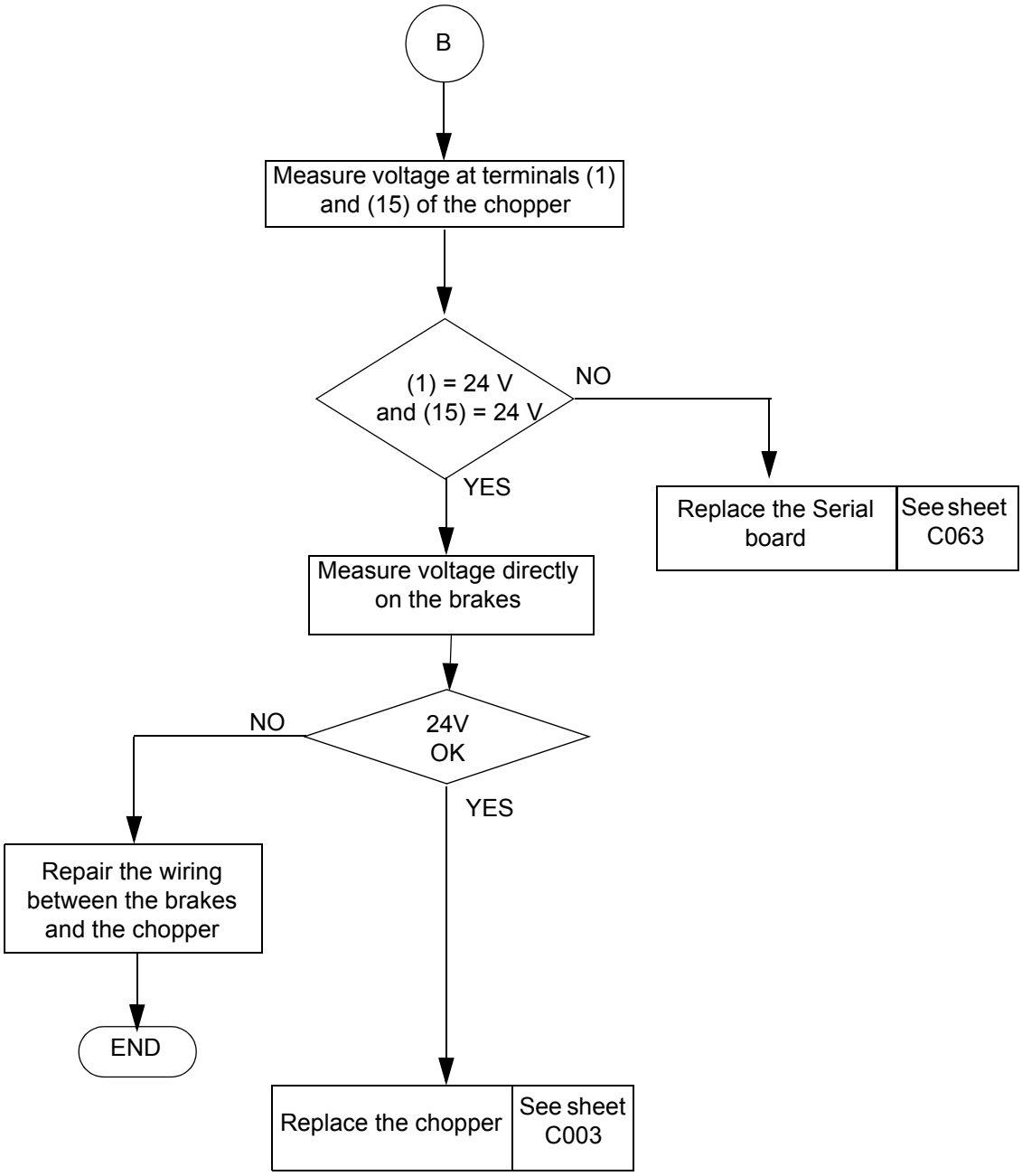
| Sheet DP083 | BREAKDOWN DETECTION FLOW CHART<br>NO FORWARD OR REVERSE TRAVEL MOVEMENT | Folio 1/4 |
|---|---|---|


No forward or reverse travel movement from the platform
Put the key switch in the "Platform" position. Activate FOR and REV travel
Open the "Platform" box and measure voltage at CN23 and CNB6 of the platform board
CN23 = 24V
CNB6 = 0V
NO
YES
A
Measure voltage at the terminals of selector switch SA2
SA2a (29A) = 24V
SA2b = 0V
NO
YES
Replace the selector
See sheet C143
Repair the wiring
END

| Sheet DP083 | BREAKDOWN DETECTION FLOW CHART<br>NO FORWARD OR REVERSE TRAVEL MOVEMENT | Folio 2/4 |
|---|---|---|

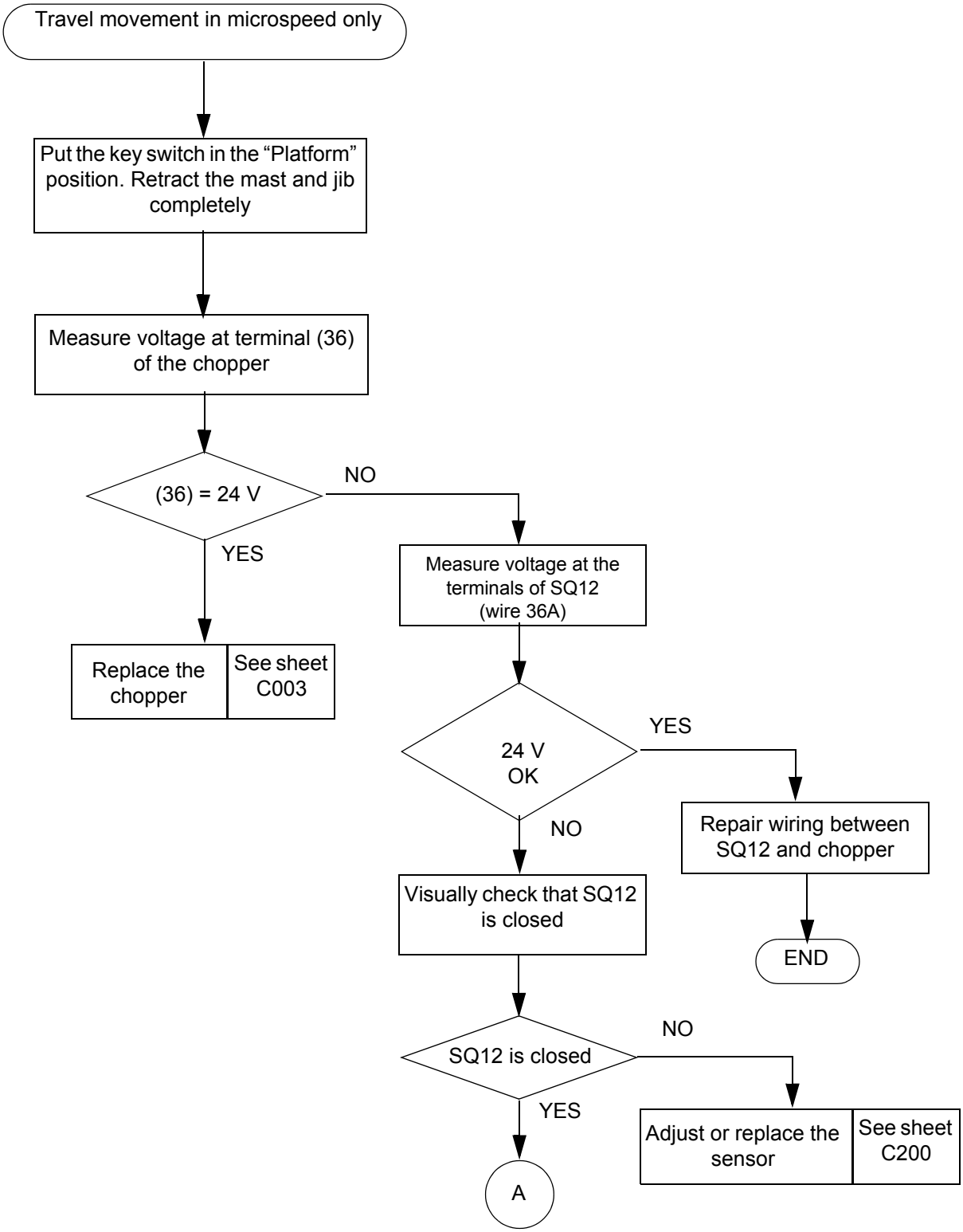


| Sheet DP083 | BREAKDOWN DETECTION FLOW CHART<br>NO FORWARD OR REVERSE TRAVEL MOVEMENT | Folio 3/4 |
|---|---|---|

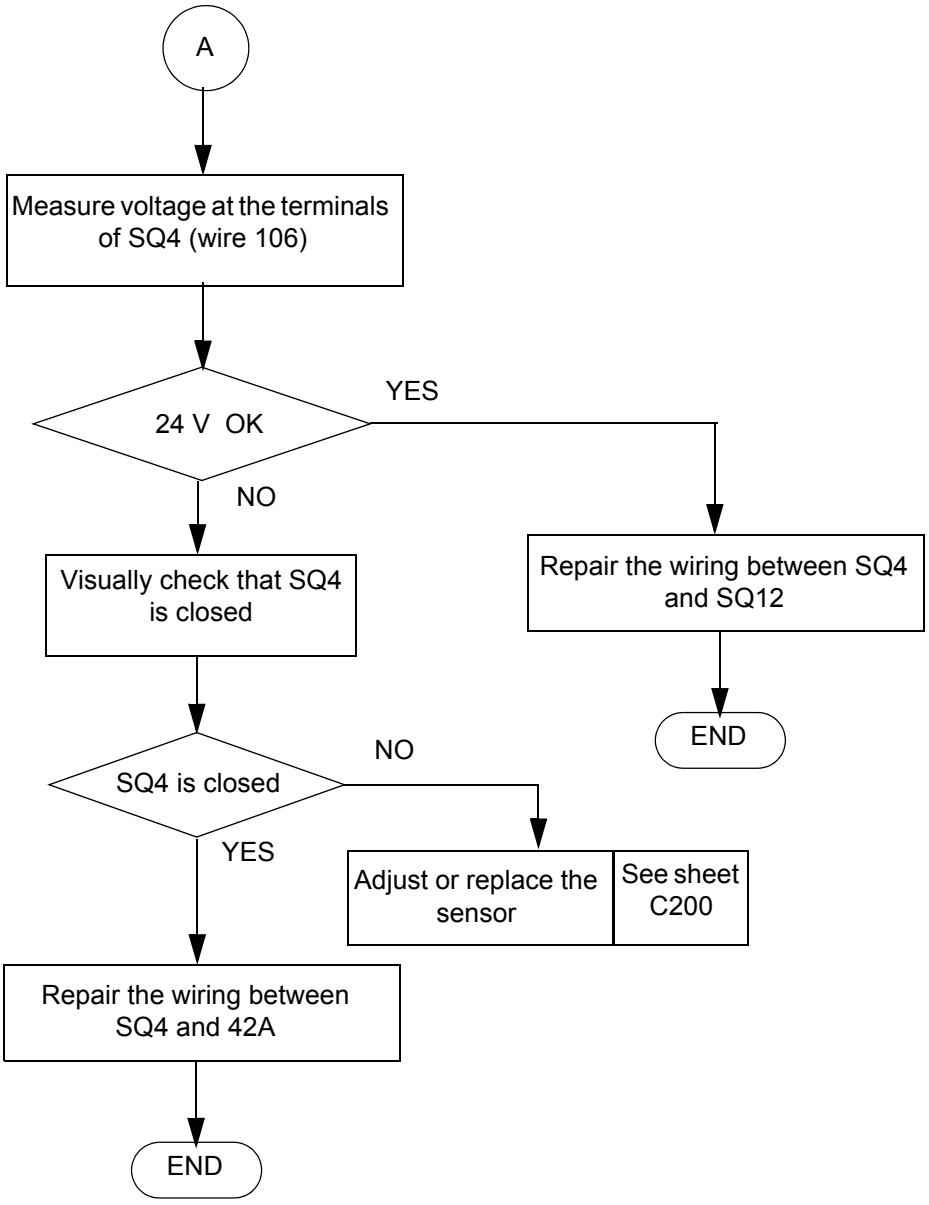


| | | |
|---|---|---|
| Sheet DP083 | BREAKDOWN DETECTION FLOW CHART<br>NO FORWARD OR REVERSE TRAVEL MOVEMENT | Folio 4/4 |

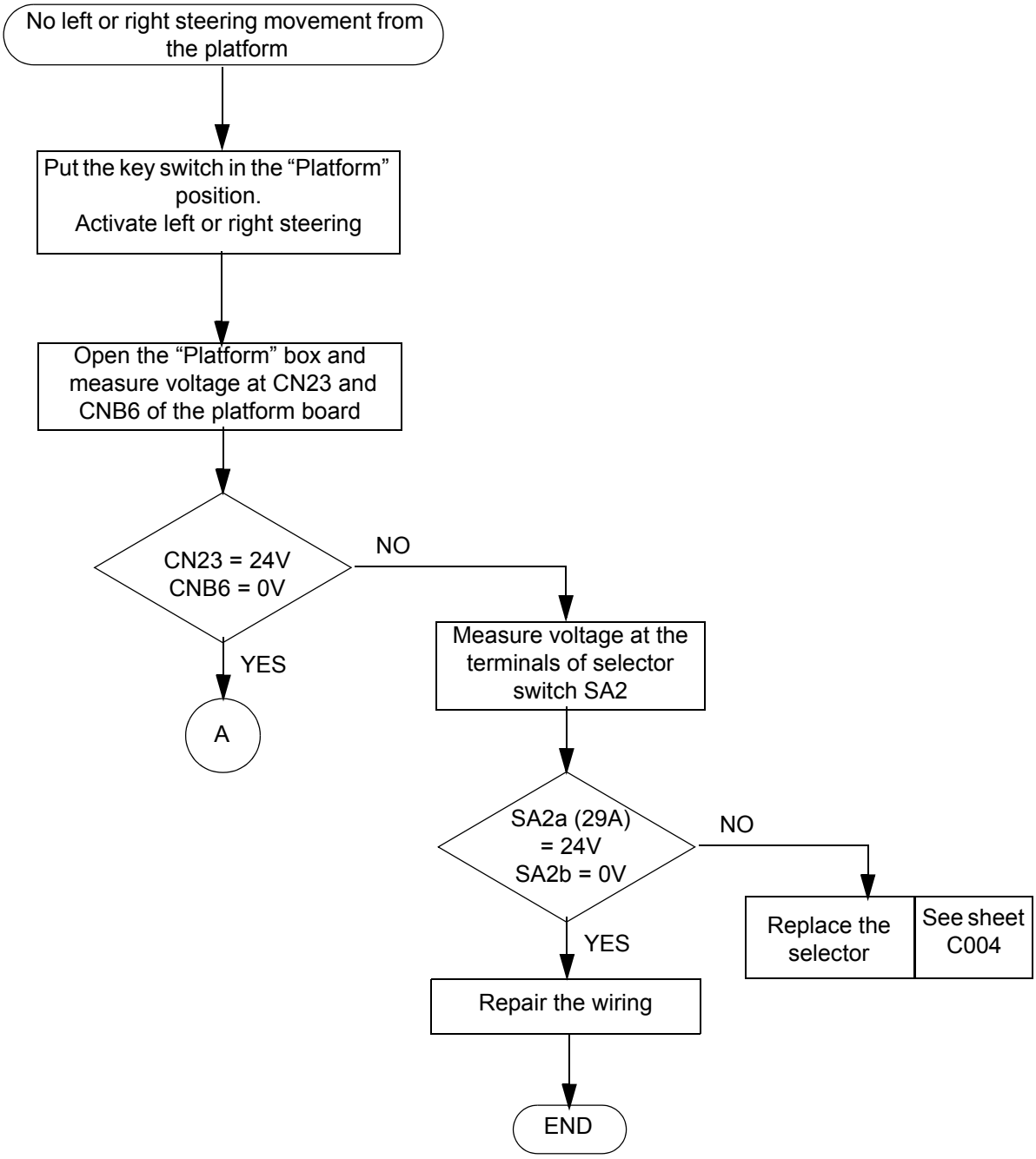
| Sheet DP084 | BREAKDOWN DETECTION FLOW CHART<br>TRAVEL MOVEMENT IN MICROSPEED ONLY | Folio 1/2 |
|---|---|---|



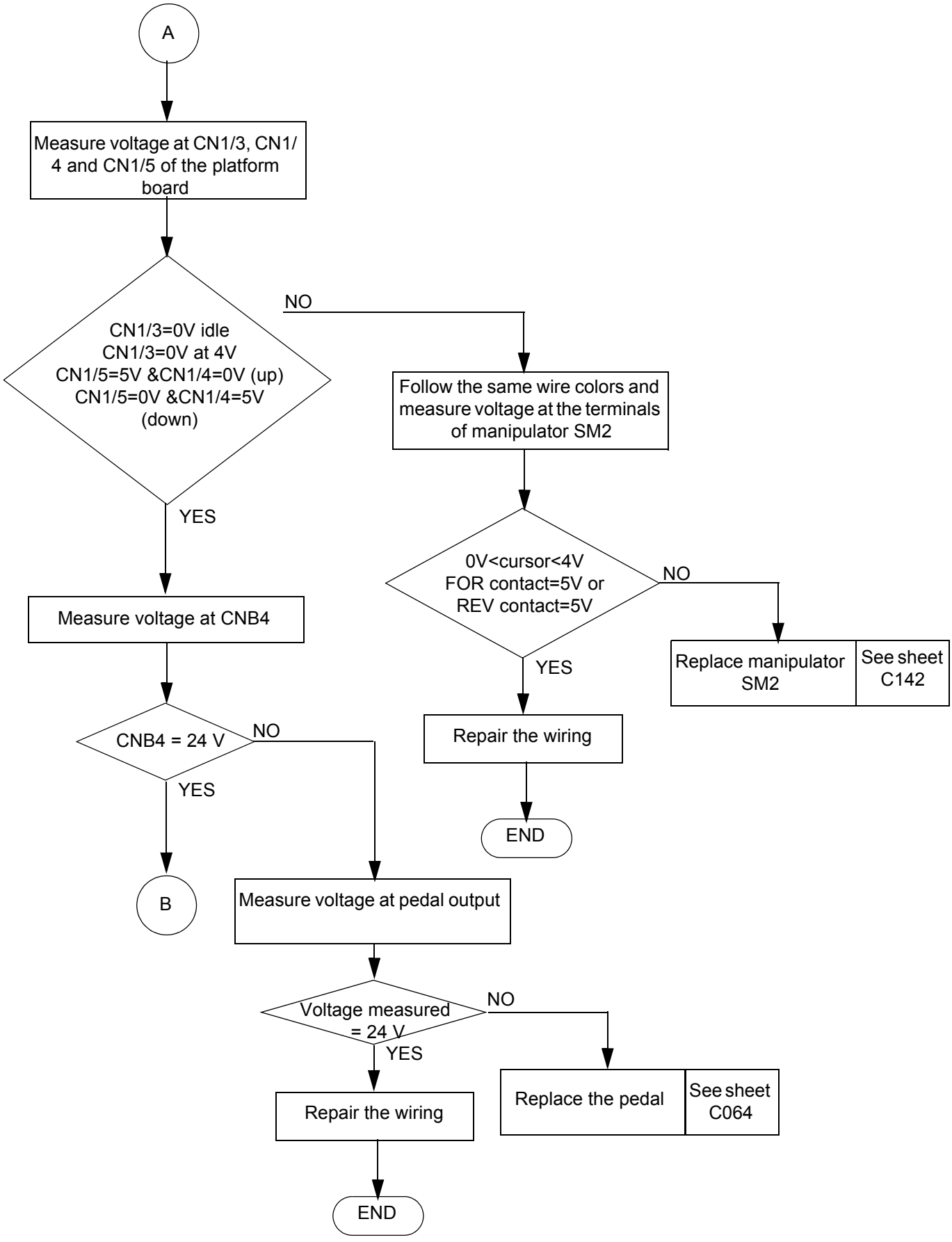
| Sheet DP084 | BREAKDOWN DETECTION FLOW CHART<br>TRAVEL MOVEMENT IN MICROSPEED ONLY | Folio 2/2 |
|---|---|---|



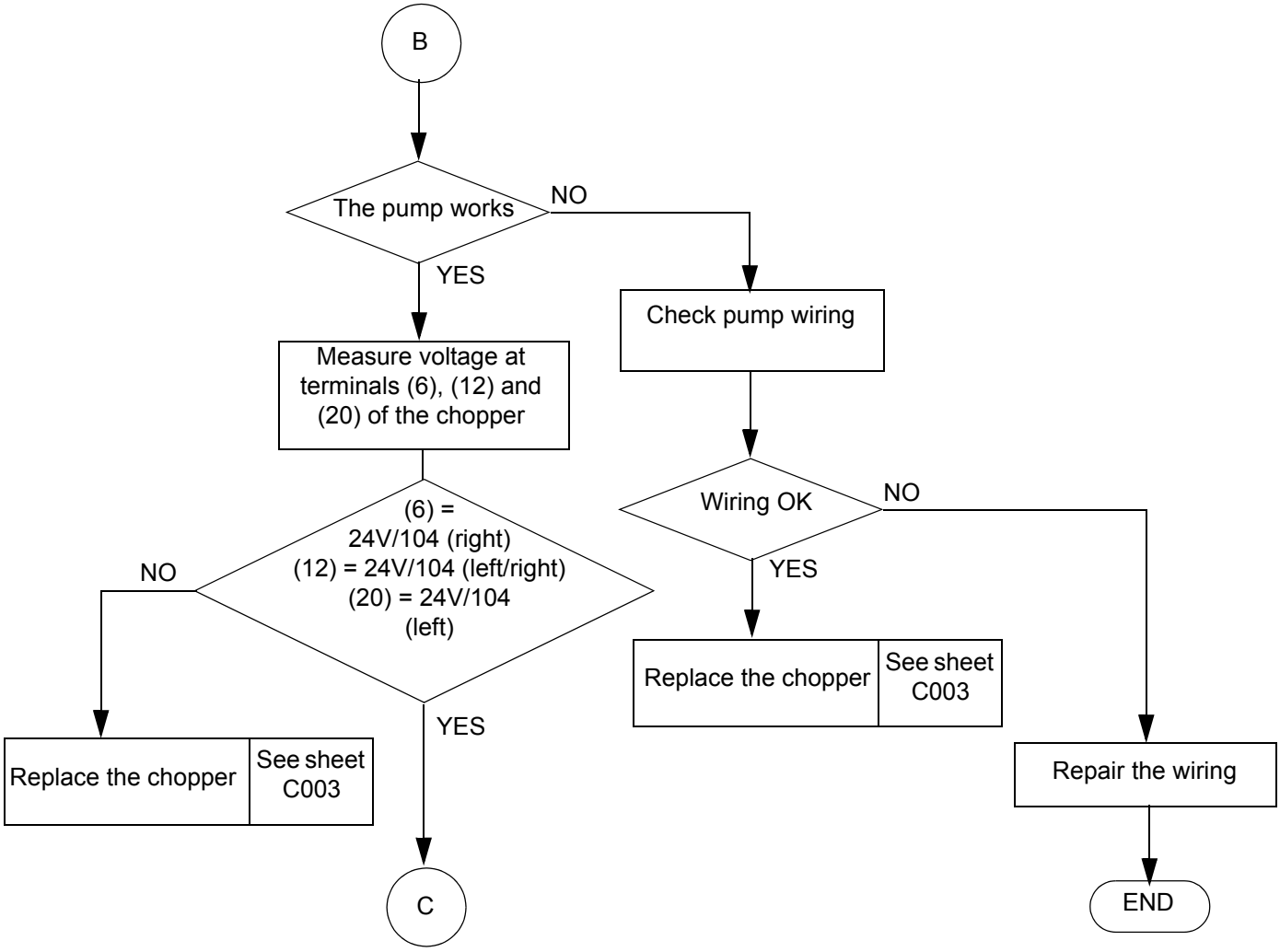
| Sheet DP085 | BREAKDOWN DETECTION FLOW CHART<br>NO LEFT OR RIGHT<br>STEERING MOVEMENT | Folio 1/4 |
|---|---|---|


No left or right steering movement from the platform
Put the key switch in the “Platform” position.
Activate left or right steering
Open the “Platform” box and measure voltage at CN23 and CNB6 of the platform board
CN23 = 24V
CNB6 = 0V
NO
YES
A
Measure voltage at the terminals of selector switch SA2
SA2a (29A) = 24V
SA2b = 0V
NO
YES
Replace the selector
See sheet C004
Repair the wiring
END

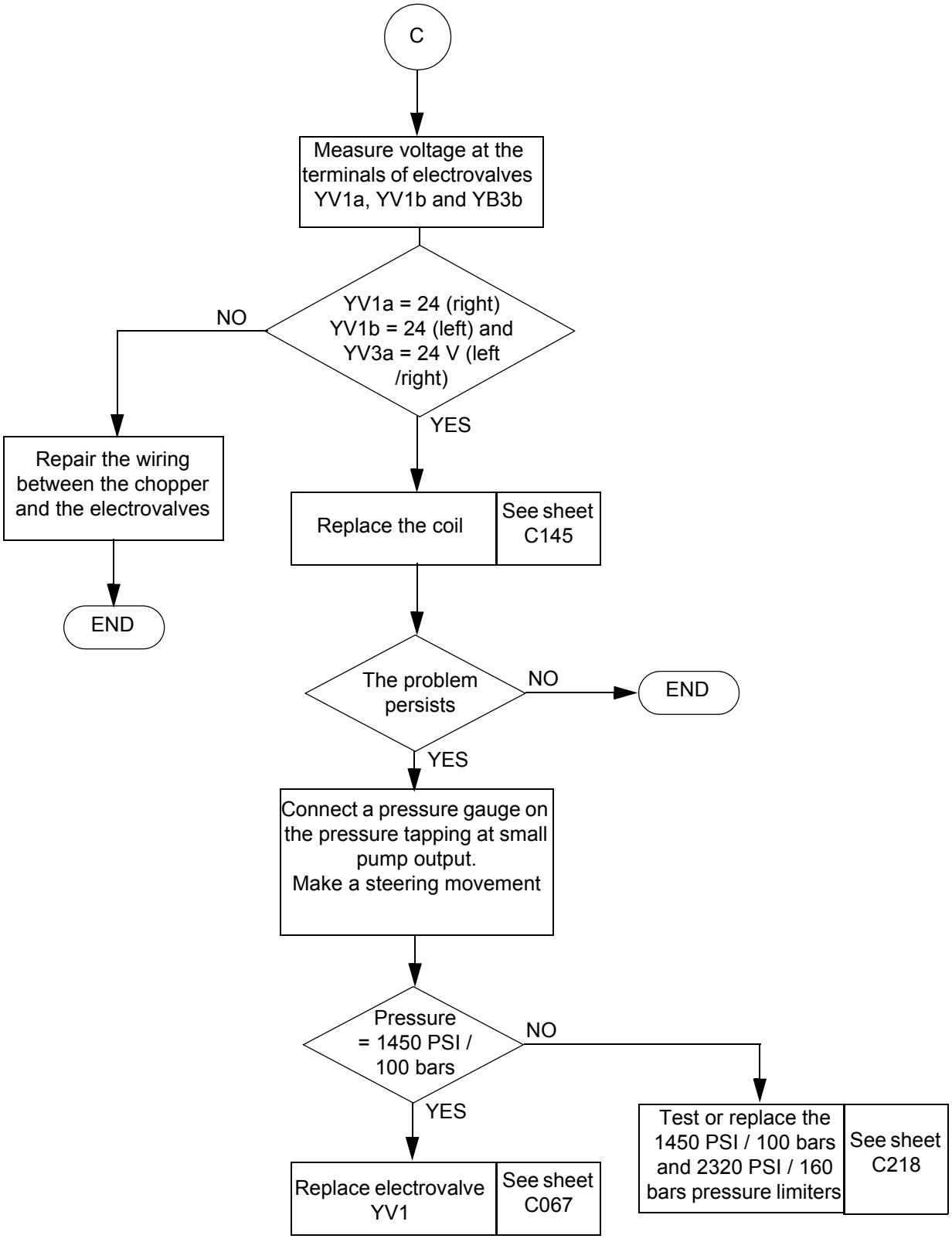
| Sheet DP085 | BREAKDOWN DETECTION FLOW CHART<br>NO LEFT OR RIGHT<br>STEERING MOVEMENT | Folio 2/4 |
|---|---|---|



| Sheet DP085 | BREAKDOWN DETECTION FLOW CHART<br>NO LEFT OR RIGHT<br>STEERING MOVEMENT | Folio 3/4 |
|---|---|---|



| Sheet DP085 | BREAKDOWN DETECTION FLOW CHART<br>NO LEFT OR RIGHT STEERING MOVEMENT | Folio 4/4 |
|---|---|---|


C
Measure voltage at the terminals of electrovalves YV1a, YV1b and YB3b
YV1a = 24 (right) YV1b = 24 (left) and YV3a = 24 V (left /right)
NO
YES
Repair the wiring between the chopper and the electrovalves
END
Replace the coil
See sheet C145
The problem persists
NO
END
YES
Connect a pressure gauge on the pressure tapping at small pump output. Make a steering movement
Pressure = 1450 PSI / 100 bars
NO
YES
Test or replace the 1450 PSI / 100 bars and 2320 PSI / 160 bars pressure limiters
See sheet C218
Replace electrovalve YV1
See sheet C067

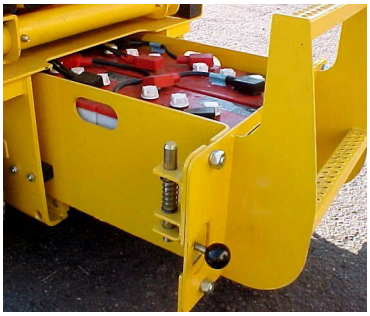
# 13 - CORRECTIVE MAINTENANCE PROCEDURE

List of corrective maintenance sheets:

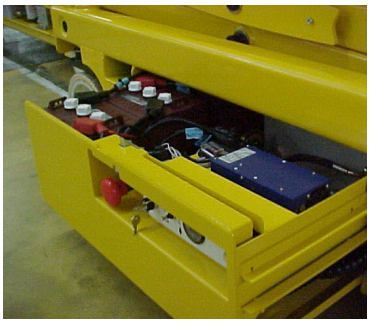
| *Sheet no.* | *Description* |
|---|---|
| C003 | Replacing the chopper |
| C004 | Replacing a component of the platform control station |
| C010 | Replacing a hose |
| C040 | Replacing the horn |
| C060 | Replacing the hand pump |
| C063 | Replacing the printed circuit |
| | |
| C067 | Replacing an electrovalve |
| C139 | Charging the traction batteries |
| C140 | Replacing the tilt sensor |
| C141 | Replacing the jib cylinder |
| C142 | Replacing the top panel manipulator |
| C143 | Replacing the bottom panel manipulator |
| C144 | Replacing a steering wheel |
| C145 | Replacing a coil |
| C146 | Replacing the steering potentiometer |
| C147 | Replacing the covers |
| C148 | Replacing the hydraulic winder |
| C149 | Replacing the batteries |
| C198 | Dismantling - reassembling the mast |
| C200 | Replacing an end of travel contactor |
| C201 | Replacing the hydraulic filter |
| C202 | Replacing the hydraulic block |
| C203 | Replacing the motor pump unit |
| C204 | Replacing the hydraulic pump |
| C205 | Replacing the rotation motor |
| C206 | Replacing a drive wheel |
| C207 | Replacing the hydraulic tank |
| C208 | Replacing the turntable emergency stop button |
| C209 | Replacing the battery charger |
| C210 | Replacing the slew ring |
| C211 | Replacing a steering pivot |
| C212 | Replacing a steering cylinder |
| C213 | Replacing the counterweights |
| C214 | Replacing the electric plate |

| *Sheet no.* | *Description* |
|---|---|
| C215 | Replacing the jib-platform assembly |
| C216 | Removing - reinstalling the cable sleeve |
| C217 | Replacing a wheel reducer or a hydraulic travel motor |
| C218 | Adjusting a pressure limiter |

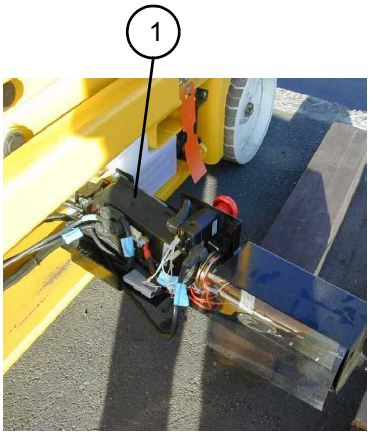
| SHEET C003 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/2 |
|---|---|---|
| | REPLACING THE SPEED VARIATOR | |



Compact



Optimum




Compact

**1 - Preliminary operations**

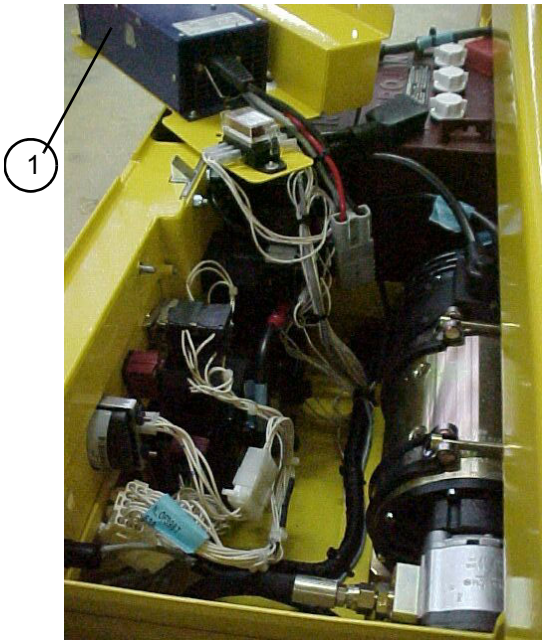
- Put the machine in the low position.
- Cut off the electric power supply (see § 6.3, page 22).
- Disconnect the + and - terminals of the batteries to isolate the electric circuit.

**2 - Removing the speed variator**

- Disconnect the speed variator's electric connections.
- Remove the speed variator (1).

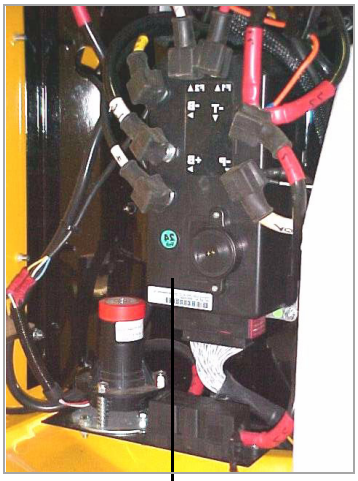
**3 - Replacing the speed variator**

- Put the speed variator back into place and secure with the fixing screws.
- Reconnect the speed variator's electric connections.
- Reconnect the + and - terminals of the batteries.
- Put the machine back in the operational configuration.
-




Optimum

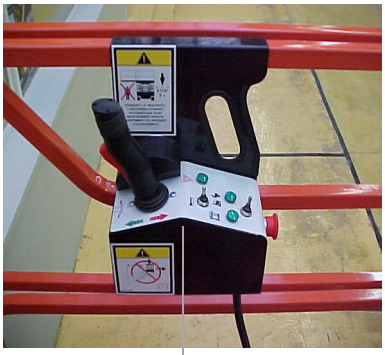
| | | |
|---|---|---|
| SHEET C003 | CORRECTIVE MAINTENANCE SHEET | Sheet 2/2 |
| | REPLACING THE SPEED VARIATOR | |




Star 22 J / Star 8

| SHEET C004 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING A COMPONENT ON THE PLATFORM CONTROL PANEL | |

***Caution!***
***Do not use the machine during maintenance operations.***



**1 - Preliminary operations**

- Cut off the electric power supply (see § 6.3, page 22).

**2 - Removing a component from the platform control panel**

- Remove the closing plate (1) by unscrewing the four fixing screws.
- Mark and disconnect the electric connections of the component to be replaced.
- Remove the component.

**3 - Replacing a component on the platform control panel**

- Put a new component and seal into place on the front of the platform control panel.

*NB:* *If it is a lever switch, adjust the position of the fixing nut and counter nut so that the switch lever joint axle is on the same level as the seal, to ensure tightness.*

- Reconnect the electric connections according to the marks made when dismantling.
- Fix the closing plate with the four fixing screws.
- Perform the function corresponding to the replaced component to check that it works properly.

| | | |
|---|---|---|
| | CORRECTIVE MAINTENANCE SHEET | |
| | | |

| Sheet C010 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | CHANGING A HOSE | |

**1 - Preliminary operations**

- Put the machine in the maintenance configuration (see corresponding paragraph).
- Switch off electric power (see corresponding paragraph).
- Close the shut-off valve, if any; if not, empty the hydraulic tank.

***Caution!***
***Ensure that the oil is not too hot.***

**2 - Removing a hose**

- Disconnect the hose from the equipment to which it is connected.

*NB: Unscrew the hose slowly to release residual hydraulic pressure.*

***Caution!***
***Use a container to collect oil to prevent pollution of the environment.***

- Protect the holes of the equipment using caps.

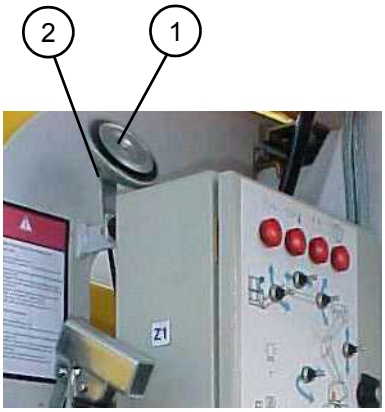
**3 - Installing a hose**

- Reconnect a new hydraulic hose.
- Put the machine back into the operational configuration.
- Make several movements using the hose to purge the hydraulic circuit.
- Check the level in the hydraulic oil tank.

| | | |
|---|---|---|
| | CORRECTIVE MAINTENANCE SHEET | |
| | | |

| Sheet C040 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | CHANGING THE HORN | |

***Caution!***
***Do not use the machine during maintenance operations.***




HA16 - PX / HA18 PX / HA 465 RT

Star 22J / Star 8

***Caution!***
***The horn should be audible from the basket.***

**1 - Preliminary operations**

- Switch off electric power (see corresponding paragraph).

**2 - Removing the horn**

- Mark and disconnect the electric connections from the horn (1).
- Remove the horn, by unscrewing the fixing bolts (2).

**3 - Installing the horn**

- Put the horn back into place and fix with the fixing bolt.
- Reconnect the electric connections according to the marks made during dismantling.

**4 - Test**

- Select the top control panel and switch on machine power.
- Put the machine back into the operational configuration.
- Activate the horn switch from the platform control panel and check that the horn sounds.

| | | |
|---|---|---|
| | CORRECTIVE MAINTENANCE SHEET | |
| | | |

| Sheet C060 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | CHANGING THE HAND PUMP | |

***Caution!***
***Use a container to collect oil to prevent pollution of the environment.***

HA16 PX - HA18 PX / HA 465 RT

**1 - Preliminary operations**

- Put the machine in the maintenance configuration (see § 6.3, page 32).

**2 - Removing the hand pump**

- Mark and disconnect the hydraulic hoses (2) from the hand pump (1).

*NB:* *Unscrew the hoses slowly to release residual hydraulic pressure.*

- Fit caps to the hoses.
- Remove the union pieces (3) from the hand pump.
- Remove the hand pump by removing its fixing bolts (5).

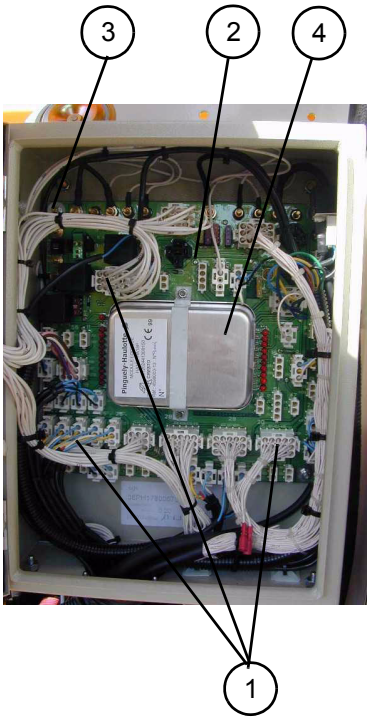
**3 - Installing the hand pump**

- Put a new hand pump into place and fix using the fixing bolts.
- Replace the non-return valve (6) if necessary.
- Install the union pieces on the pump.
- Reconnect the hydraulic hoses, according to the marks made during dismantling.
- Put the machine back into the operational configuration.
- Close the decompression valve (4).
- Perform an emergency operation to check that the hand pump works properly (see «Operation and Maintenance Instructions» manual).
- Open the decompression valve.

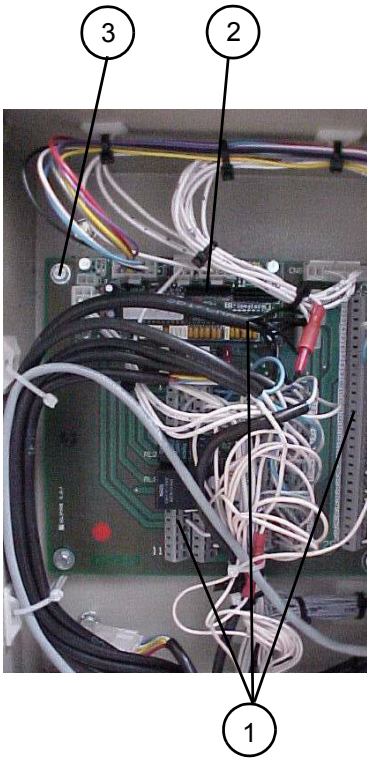
Star 22 J / Star 8

| | | |
|---|---|---|
| | CORRECTIVE MAINTENANCE SHEET | |
| | | |

| Sheet C063 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | CHANGING THE PRINTED CIRCUIT | |




HA16 PX - HA18 PX / HA 465 RT




Star 22J / Star 8

**1 - Preliminary operations**

- Put the machine in the maintenance configuration (see corresponding paragraph).
- Switch off electric power (see corresponding paragraph).
- Disconnect the « - » then « + » terminals of the starter battery.

**2 - Removing the printed circuit**

- Open the turntable electric box.
- Carefully mark and disconnect all the electric connections (1) of the printed circuit (2).
- Remove the U1 electronic module (4) (see corresponding sheet)
- Remove the bolts (3) fixing the board to the box and their sealing washers.
- Remove the printed circuit and silent-blocks equipping the fixing bolts.
- **STAR only** : disconnect the printed circuit's serial card.

**3 - Installing the printed circuit**

- Put a new printed circuit into place and fix using the bolts equipped with silent blocks, sealing rings and new toothed washers.
- **STAR only :** Install the printed circuit's serial card.
- Install the U1 electronic module (**except STAR**) (see corresponding sheet).
- Reconnect the electric connections according to the marks made during dismantling.
- Close the turntable box.
- Reconnect the « + » then « - » terminals of the starter battery.
- Put the machine back into the operational configuration.
- Test the printed circuit.

**4 - Testing the printed circuit**

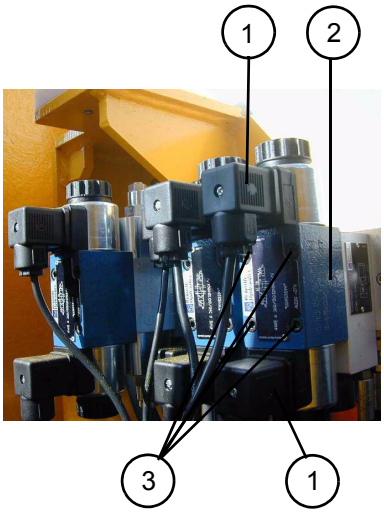
- Perform the computer operating test (see «changing the U1 electronic module» sheet).

| | | |
|---|---|---|
| | CORRECTIVE MAINTENANCE SHEET | |
| | | |

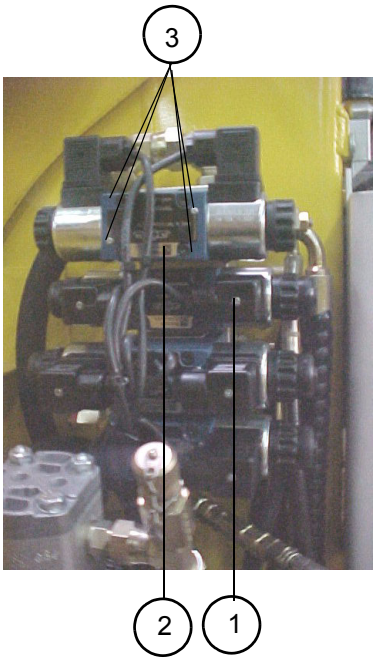
| Sheet C067 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/2 |
|---|---|---|
| | CHANGING AN ELECTROVALVE | |

***Caution!***
***Ensure that the oil is not too hot.***

***Caution!***
***Use a container to collect oil to prevent pollution of the environment.***




HA16 PX - HA18 PX / HA 465 RT




Star 22 J / Star 8

**1 - Preliminary operations**

- Put the machine in the maintenance configuration (see corresponding paragraph).
- Switch off electric power (see corresponding paragraph).

**2 - Removing an electrovalve**

- Mark and disconnect the electric connections(1) of the coils.
- Mark the installation position of the electrovalve on the block.
- Unscrew the four fixing screws (3) of the electrovalve (2) and remove.

**3 - Installing an electrovalve**

- Put a new electrovalve equipped with its seals into place and fix using the 4 screws, in the position of the electrovalve on the block. Tighten to the recommended torque (see corresponding paragraph).
- Reconnect the electrovalve's electric connections, according to the marks made during dismantling.
- Put the machine back into the operational configuration.
- Make several movement cycles using the replaced electrovalve to purge the hydraulic circuit.
- Check the level of the hydraulic oil tank.

| | | |
|---|---|---|
| | CORRECTIVE MAINTENANCE SHEET | |
| | | |

| Sheet C139 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | CHARGING THE TRACTION BATTERIES | |

***Caution!***
***Do not use the machine during the charging process.***

***Caution!***
***Use the machine's on-board charger. Its charge output is suited to the machine.***

***Caution!***
***Safety precautions are required for battery servicing operations (wear gloves and protective goggles).***

**1 - Preliminary operations**

- Ensure that the mains supply is suitable for the charger's consumption and voltage.
- Fill to the minimum electrolyte level if an element's level is below this minimum.
- Work in a clean, ventilated area, away from naked flames.

**2 - Charging the batteries**

*NB: Charging starts automatically as soons as the mains supply is connected. For information: charging time for a battery discharged by 80% is approximately 15 hours.*

- Connect the plug (2) to the mains (110V for USA).
- Check the charge state on the light (3) on the bottom control panel.
  - Red zone: machine charging
  - Yellow zone: 80% of charging complete
  - Green zone: batteries charged

**3 - During charging**

- Do not remove or close the element caps.
- Ensure that element temperature does not exceed 45°C (be careful in summer or in rooms with high ambient temperature).

**4 - After charging**

- Top up the electrolyte level if necessary.

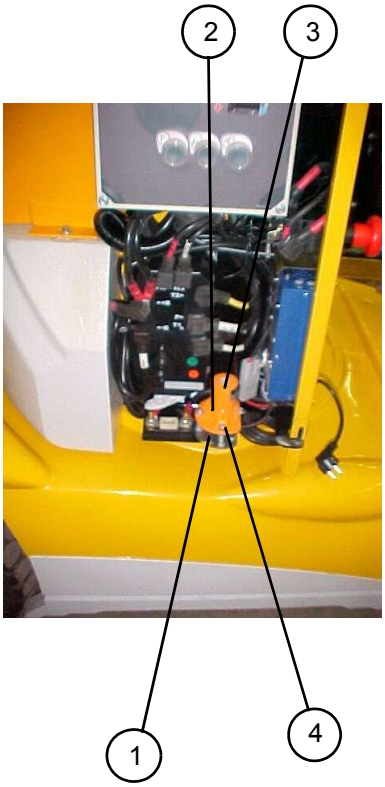
**4 - Additional operations**

- Put the machine back into the operational configuration.

| | | |
|---|---|---|
| | CORRECTIVE MAINTENANCE SHEET | |
| | | |

| Sheet C140 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING THE TILT SENSOR | |

***Caution!***
***Do not use the machine during maintenance operations.***




**1 - Preliminary operations**

- Put the machine on a flat, level surface.
- Put the machine in the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

**2 - Removing the tilt sensor**

- Mark and disconnect the electric connections of the tilt sensor.
- Remove the tilt sensor (2) by unscrewing the fixing bolts (1).

**3 - Re-installing the tilt sensor**

- Put a new tilt sensor into place and secure with the fixing bolts (1).
- Reconnect the electric connections according to the marks made during dismantling.
- Set the adjusting screw (4) so that the tilt sensor level is set.
- Put the machine back into the operational configuration.

**4 - Tilt sensor operating test**

- Extend the machine.
- Tilt the tilt sensor and check that an audible alarm is sounded.
- Make mast up and jib lifting movements to the safety contacts.

| | | |
|---|---|---|
| | CORRECTIVE MAINTENANCE SHEET | |
| | | |

| Sheet C141 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | CHANGING THE JIB CYLINDER | |

***Caution!***
***Ensure that the oil is not too hot.***

Photo 1

**1 - Preliminary operations**

- Put the machine in the maintenance configuration (see relevant section).
- Switch off the electric power supply.
- Put the basket in slings to ensure it does not fall (Photo 1) and secure it.
- Slightly lift the drum to facilitate access to the cylinder.

**2 - Removing the jib cylinder**

- Put the cylinder (1) and the vertical parts (2) and (3) of the jib into slings.
- Mark and disconnect the 2 hydraulic hoses of the jib cylinder.

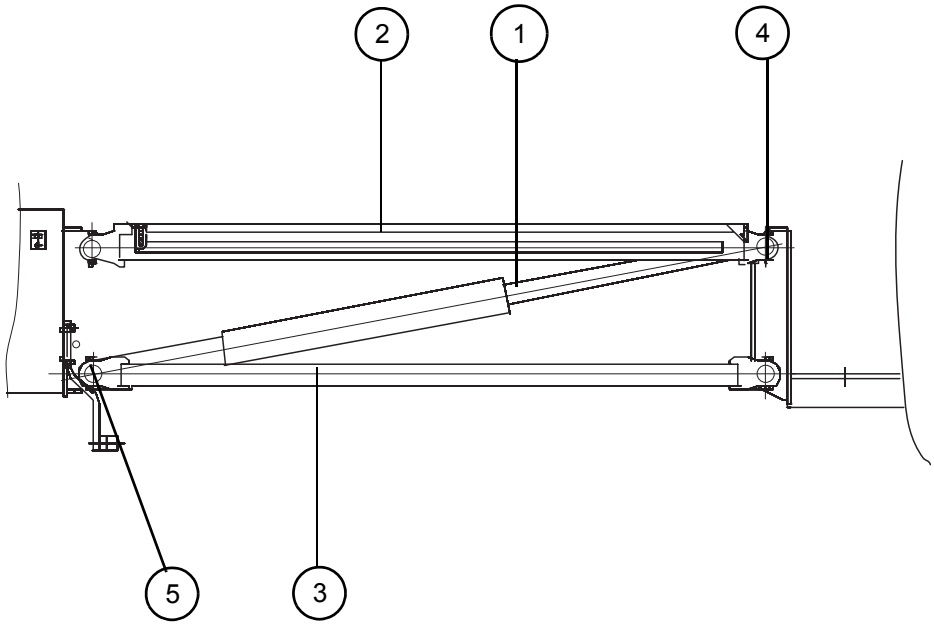
*NB: Unscrew the hoses slowly to release residual hydraulic pressure.*

- Put caps on the hoses.
- Remove the 2 bolts of the cylinder pin (4) on the cylinder body side.
- Remove the pin (4).
- Remove the 2 bolts of the cylinder pin (5) on the rod side.
- Remove the pin (5).
- Remove the jib cylinder (1).

**3 - Reinstalling the jib cylinder**

*NB: Before reassembly, check the condition of all articulated pin rings, and replace if necessary. Lubricate all bores before reinstalling the pins. Only use lubricants recommended by the manufacturer.*

- Put the jib cylinder into place and reinstall the 2 articulation pins on the cylinder rod and body sides.
- Secure the pins with their bolts.
- Remove the slings.



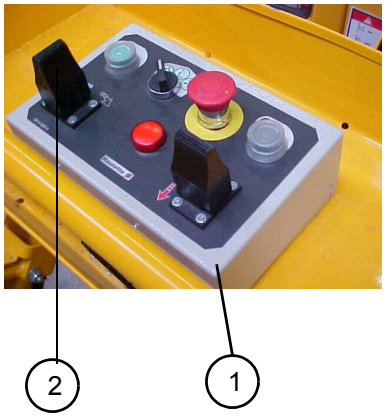

**4 - Additional operations**

- Put the machine back into the operational configuration.
- Make several jib movements to test operation and purge the hydraulic circuit.
- Check the hydraulic circuit level.

| | | |
|---|---|---|
| | CORRECTIVE MAINTENANCE SHEET | |
| | | |

| SHEET C142 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING THE TOP PANEL MANIPULATOR | |

***Caution!***
***Do not use the machine during maintenance operations.***




**1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

**2 - Removing the manipulator (2)**

- Remove the closing plate (1) by taking out the four fixing screws.
- Mark and disconnect the electric connections of the manipulator.
- Remove the manipulator by taking out the fixing screws.

**3 - Reinstalling the manipulator**

- Fix a new manipulator equipped with new seals on the platform control panel.
- Reconnect the electric connections according to the marks made during dismantling.
- Put back the closing place and secure with the four fixing screws.
- Put the machine back into the operational configuration.
- Make several up and down movements from the platform control panel to test manipulator operation.

| | | |
|---|---|---|
| | CORRECTIVE MAINTENANCE SHEET | |
| | | |

| SHEET C143 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING THE BOTTOM PANEL MANIPULATOR | |

***Caution!***
***Do not use the machine during maintenance operations.***

**1 - Preliminary operations**

- Put the machine in the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

**2 - Removing the manipulator (2)**

- Remove the closing plate (1) by taking out the four fixing screws.
- Mark and disconnect the electric connections of the manipulator.
- Remove the manipulator by taking out its fixing screws.

**3 - Reinstalling the manipulator**

- Fix a manipulator equipped with new seals on the turntable control panel.
- Reconnect the electric connections according to the marks made during dismantling.
- Put the closing plate back into place and secure with the four fixing screws.
- Put the machine back into the operational configuration.
- Make several up and down movements from the turntable control panel to test manipulator operation.

| | | |
|---|---|---|
| | CORRECTIVE MAINTENANCE SHEET | |
| | | |

| SHEET C144 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING A STEERING WHEEL | |

**1 - Preliminary operations**

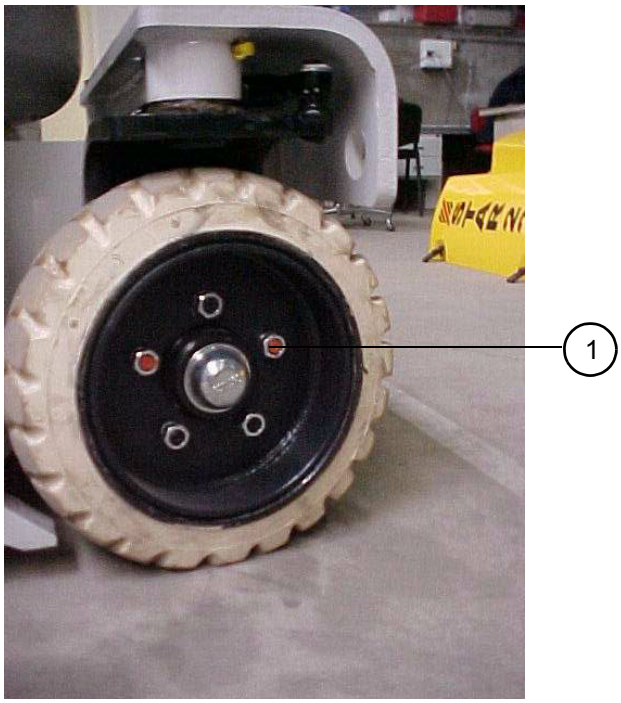
- Put the machine in the low configuration.
- Switch off the electric power supply (see relevant section).

**2 - Removing a wheel**

- Slacken (without completely unscrewing) the nuts of the wheel to be removed.
- Raise the machine using a jack or hoist.
- Remove the 5 wheel nuts (1) and remove the wheel.

**3 - Reinstalling a wheel**

- Put a new wheel into place and put back the nuts (1).
- Lower the machine back to the ground.
- Tighten the nuts. Tightening torque for wheel nuts: 213 ft.lb / 29 m dNm
- Put the machine back into the operational configuration.



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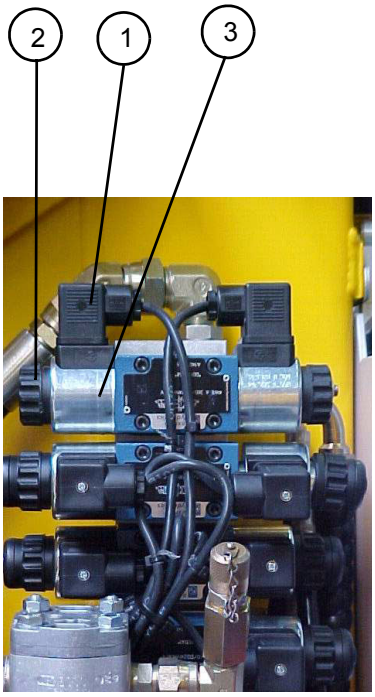
|---|---|---|
| | CORRECTIVE MAINTENANCE SHEET | |
| | | |

| SHEET C145 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING A COIL | |




**1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

**2 - Removing a coil**

- Disconnect the electric connector (1) of the coil in question.
- Unscrew the nut (2) and remove the coil (3).

**3 - Reinstalling a coil**

- Put a new coil into place (3) and secure with the nut (2).
- Reconnect the electric connector (1) on the coil.
- Put the machine back into the operational configuration.
- Check correct operation by making the movement corresponding to the replaced coil.

| | | |
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| | CORRECTIVE MAINTENANCE SHEET | |
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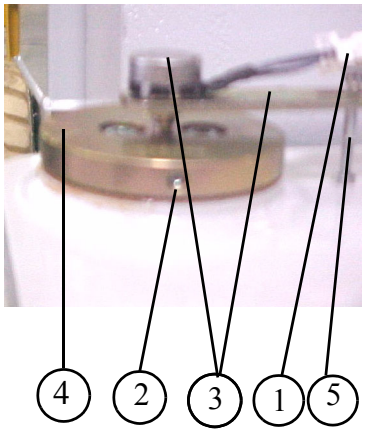
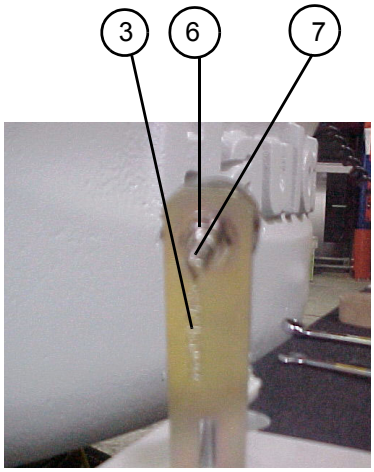
| SHEET C146 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING AND SETTING THE STEERING POTENTIOMETER | |

***Caution!***
***Before final reinstallation of the steering potentiometer, it must be set with a zapi console by a Pinguely Haulotte technician.***




**1 - Preliminary operations**

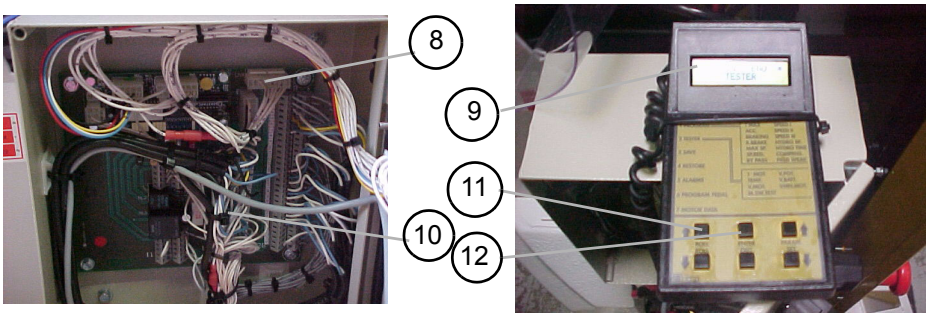
- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).
- Remove the covers (see relevant sheet).

**2 - Removing the potentiometer**

- Disconnect the electric connection (1).
- Slightly unscrew the screw (5) fixing the potentiometer support (3).
- Slacken the 2 BTR screws (2).
- Lift the potentiometer support (3) to remove the potentiometer from the fixing flat (4) of the wheel pivot.
- Unscrew the nut (6) keeping the potentiometer on its support (3).
- Remove the potentiometer (7).

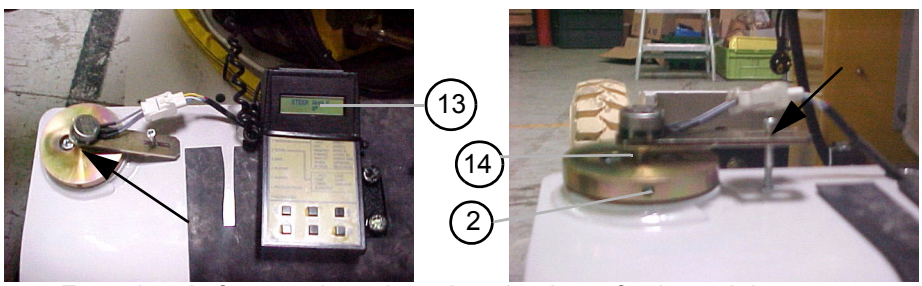
**3 - Reinstalling the potentiometer before setting**

- Connect the electric connection (1).
- Fix the new potentiometer on its support (3) by screwing the fixing nut (6).
- Connect the calibrater (9) to the MDI socket (8) on the mother board (10).




**4 - Adjusting and reinstalling the potentiometer**

- Switch on the machine in the platform station.
- Using the “Roll” buttons (11), find the “Tester” menu.
- Press “Enter” (12).
- Find the “Steer Angle” parameter.
- The angular value of the potentiometer is displayed on the console.
- Adjust the potentiometer so that the value 0 is displayed on the console (13).




- From the platform station, place the wheels perfectly straight.
- Position the potentiometer, leaving a gap of 0.07 to 0.19 in / 2 to 5 mm (14) between the potentiometer fixing nut and the wheel pivot fixing flat and fix the potentiometer support so that the head of the fixing screw does not touch the support.
- Fix the potentiometer using the BTR screws (2).

| | | |
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| | CORRECTIVE MAINTENANCE SHEET | |
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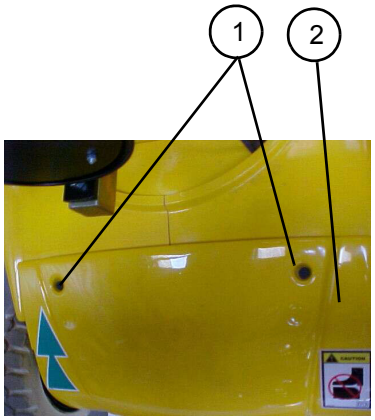
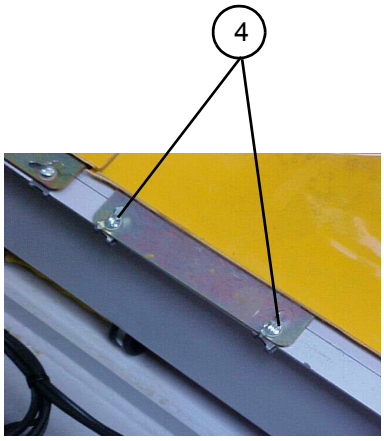
| SHEET C147 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REMOVING - REPLACING THE COVERS | |




**1 - Preliminary operations**
- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

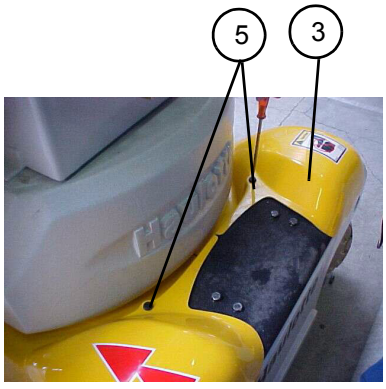
**2 - Removing the motor cover (2)**
- Unscrew the fixing screws (1).
- Remove the cover (2)

**3 - Reinstalling the motor cover (2)**
- Reinstall a cover (2).
- Tighten the fixing screws (1).




**4 - Removing a side cover (3)**
- First remove the motor cover (2)
- Manually unscrew the fins (4).
- Unscrew the screws (5).
- Remove the cover (3).

**5 - Reinstalling a side cover (3)**
- Put a new side cover into place (3).
- Screw the screws (5) and fins (4) back into place.
- Reinstall the motor cover (2).




**6 - Removing a pivoting turntable cover (6)**
- Open the cover (6) and put it into slings.
- Take the cover off its hinges (8) and remove.

**7 - Reinstalling a pivoting turntable cover (6)**
- Put a new cover into place (6).
- Remove the slings

**8 - Additional operations**
- Check that the cover is properly anchored on the machine.
- Put the machine back into the operational configuration.

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| | CORRECTIVE MAINTENANCE SHEET | |
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| Sheet C148 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REMOVING - REPLACING THE HYDRAULIC WINDER | |

***Caution!***
***Ensure that the oil is not too hot.***

***Caution!***
***Use a container to collect the oil to prevent pollution of the environment.***

**1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

*NB: Unscrew the hoses slowly to release residual hydraulic pressure.*

**2 - Removing the hydraulic winder (1)**

- Disconnect the hydraulic hoses (2) and (3).
- Put caps on the hoses.
- Unscrew the two fixing nuts (4) to free the hose (5).
- Remove the winder by taking the fixing nuts (6) off the support.

**3 - Reinstalling the hydraulic winder**

- Perform dismantling operations in reverse order to reassemble.

**4 - Additional operations**

- Put the machine back into the operational configuration.
- Make several movements using the replaced hydraulic winder to purge the hydraulic circuit.
- Check the hydraulic oil tank level.

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| | CORRECTIVE MAINTENANCE SHEET | |
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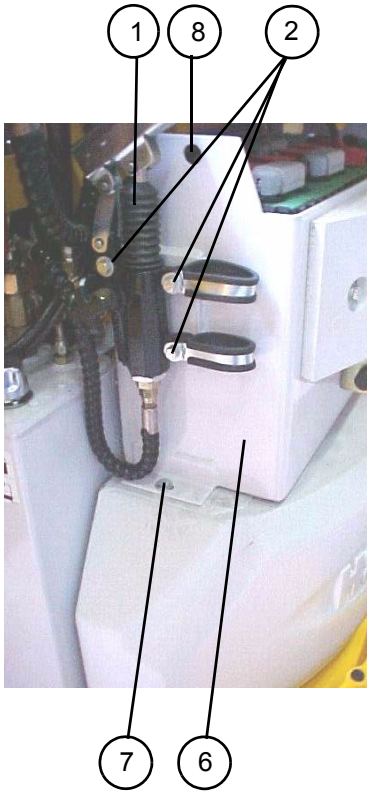
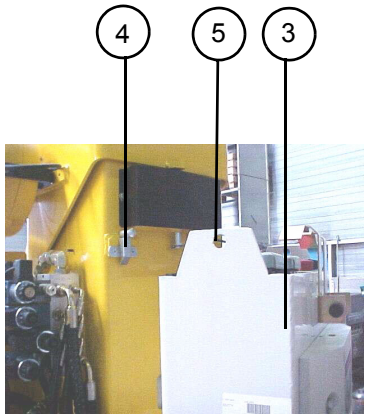
| Sheet C149 | CORRECTIVE MAINTENANCE SHEET<br>REMOVING - REPLACING THE BATTERIES | Sheet 1/1 |
|---|---|---|

***Caution!***
***Battery servicing operations require safety precautions (wear gloves and protective goggles).***




**1 - Preliminary operations**
- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).
- Remove the standby pump (1) by removing the 3 fixing nuts (2). We also recommend removing the hoses.
- Disconnect the “-” and then “+” terminals of the batteries.

**2 - Removing the upper battery (3)**
- Release the lock (4) of the battery support.
- Put the battery support into slings using the lifting rings (5).
- Pivot the support around its axis.
- Using an overhead crane, remove the battery.

**3 - Removing the lower battery (6)**
- Unscrew the 2 nuts (7).
- Put the battery support into slings using the lifting rings (8).
- Using an overhead crane, remove the battery.

**4 - Re-installing the batteries**
- Perform the dismantling operations in reverse order to reassembly, starting with re-installation of the lower battery.

**6 - Additional operations**
- Reconnect the “+” then “-” terminals of the batteries.
- Put the standby pump back into place.
- Put the machine back into the operational configuration.

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| | CORRECTIVE MAINTENANCE SHEET | |
| | | |

| Sheet C198 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/6 |
|---|---|---|
| | DISMANTLING - REASSEMBLING THE MAST | |

***Caution!***
***Ensure that the oil is not too hot.***

***Caution!***
***Use a container to collect the oil to prevent pollution of the environment.***

***Caution!***
***Make sure the lifting means are in good condition and of sufficient capacity.***

Photo 1

Photo 2

## 1 - Preliminary operations

- Put the machine in the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).
- Remove the right and left side covers (see relevant sheet).
- Remove the motor cover (see relevant sheet).
- Remove the lower right and left covers (see relevant sheet).
- Disconnect and remove the batteries (see relevant sheet).
- Disconnect the pump power supply, after marking the supply wires (see relevant sheet).
- Remove the plate covering the end of travel contactors SQ3 and SQ4 and remove them (see relevant sheet).
- Remove the hydraulic winder (see relevant sheet)
- Remove the end of travel contactor SQ12 (see relevant sheet).
- Remove the hydraulic supply hose at the top of the mast.
- Remove the jib (see relevant sheet).
- Remove the circuit breaker (see relevant sheet).
- Remove the charger (see relevant sheet).
- Remove the end of travel contactor SQ10 (see relevant sheet).
- Remove the electric plate (see relevant sheet).
- Remove the hydraulic plate (see relevant sheet).
- Remove the hydraulic filter (see relevant sheet).
- Remove the pump (see relevant sheet).
- Remove the hydraulic tank (see relevant sheet).
- Remove the hydraulic block assembly (see relevant sheet).
- Remove the rotation motor (see relevant sheet).
- Remove the counterweight (see relevant sheet).
- Remove the cable sleeve support (see relevant sheet).

## 2 - Removing the mast

- Remove the trapdoor in the middle of the mast (ref. 1 Photo 1)
- Unscrew the 12 screws on the ring (replace the screws systematically to reassemble - 8.8c class screws - HM14 x 65/34, then tighten to a torque of 99 ft.lb /135 Nm).
- Put the mast into slings (approx. 94 stones / 600 kg) (Photo 2)
- Place the mast on trestles (Photo 3)

Photo 3

- Unscrew the 3 screws from the cylinder plate at the bottom of the mast, and remove the plate.
- Unscrew the two elbow unions at the bottom of the mast (Photo 4 & Photo 5).

Photo 4 & Photo 5

Photo 6

- Put the ring support (Photo 6) into slings.
- Unscrew the 12 bolts (class 8.8 - HM16x100/38) of the ring support (Photo 7) and remove the ring with an overhead crane.
- Take the circlips off the upper part of the cylinder (Photo 8).
- Put the cylinder into slings and remove it with an overhead crane.
- Put the smallest caisson into slings and remove it with an overhead crane.
- Unscrew the 6 fixing screws on each stop of the 1st elevation caisson and remove the stops.
- Unscrew the 6 screws of the next stop and remove it.
- Put the 3rd caisson into slings and remove it with an overhead crane.
- Put the 2nd caisson into slings and remove it with an overhead crane.
- Put the 1st caisson into slings and remove it with an overhead crane.

Photo 7

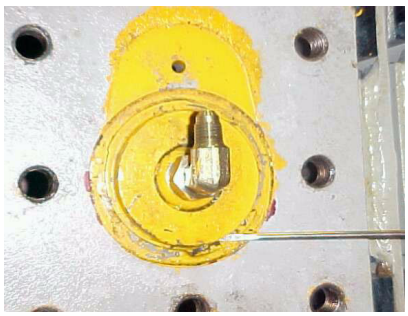


Photo 8

| Sheet C198 | CORRECTIVE MAINTENANCE SHEET | Sheet 3/6 |
|---|---|---|
| | DISMANTLING - REASSEMBLING THE MAST | |

Photo 10

**3 - Reinstalling the mast**

- Place the caissons on trestles.
- Insert the 1st caisson in the bottom of the mast.
- Check the clearance between the 1st caisson and the bottom of the mast (the gap should be between 1 and 2 mm at each end of the mast).
- Adjust the gap with a set of adjustment wedges.
- Check that the caisson works properly by sliding it manually.
- Insert the 2nd caisson into the 1st.
- Check the gap and adjust if necessary.
- Check that the caisson works properly by sliding it manually.
- Put the stops back on the 1st caisson, making it protrude by approximately 5 cm.
- Insert the 3rd caisson in the 2nd.
- Check the gap and adjust if necessary.
- Check that the caisson works properly by sliding it manually.
- Put the stop back on the 2nd caisson, making it protrude by approximately 5 cm.
- Check the gap between the 4th and 3rd caissons (the gap should be between 1 and 2 mm at each end of the mast).
- Adjust the gap with a set of adjustment wedges.
- Check that the caisson works properly by sliding it manually.

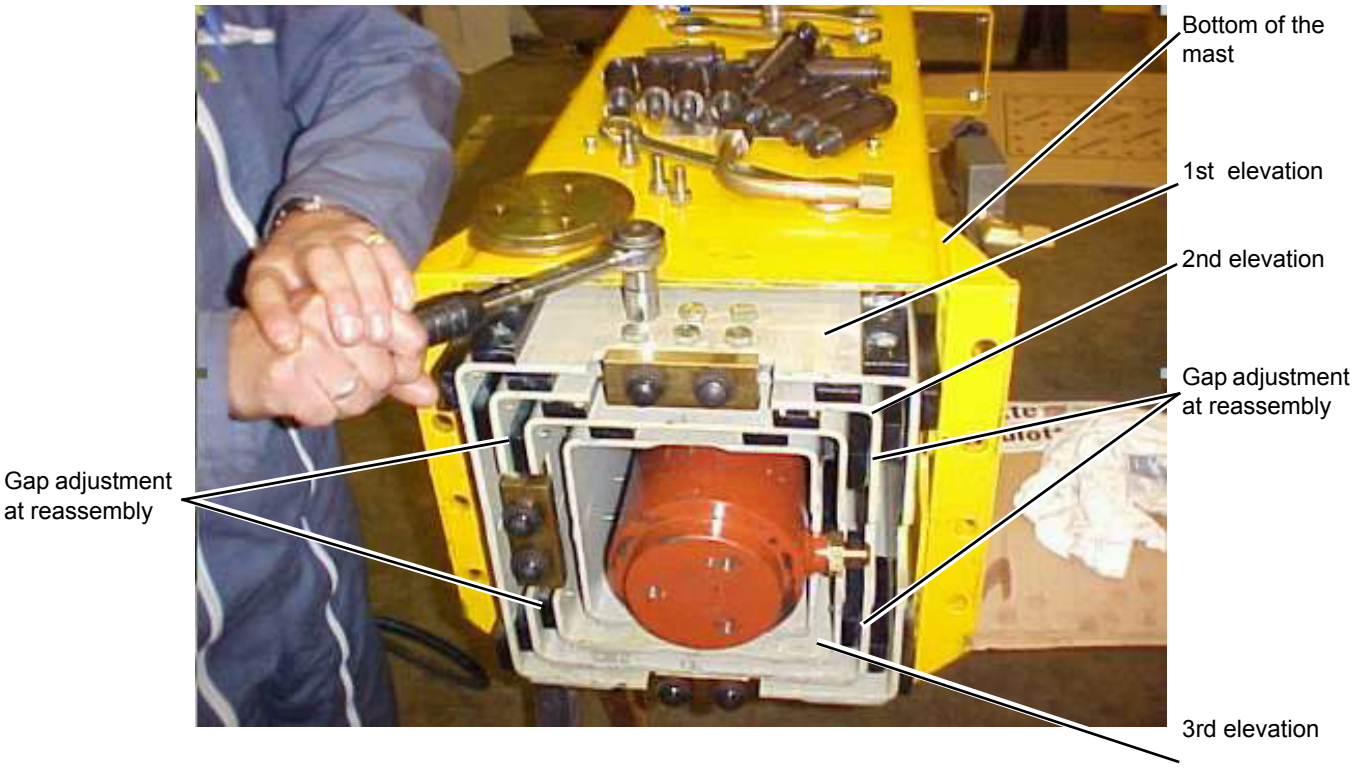



Photo 9

***Caution!***
***After assembling the mast, it is essential to have static and dynamic load tests carried out by a certified organisation.***

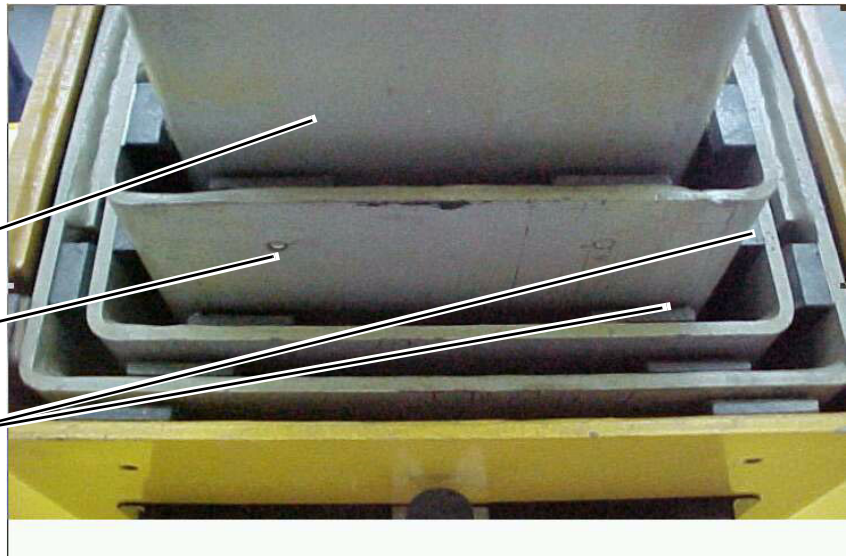
**THEN PERFORM THE DISMANTLING OPERATIONS (SECTION 2) IN REVERSE ORDER TO REASSEMBLE**

To facilitate caisson sliding, use a synthetic lubricant spray (see section listing consumables recommended by Pinguely-Haulotte).

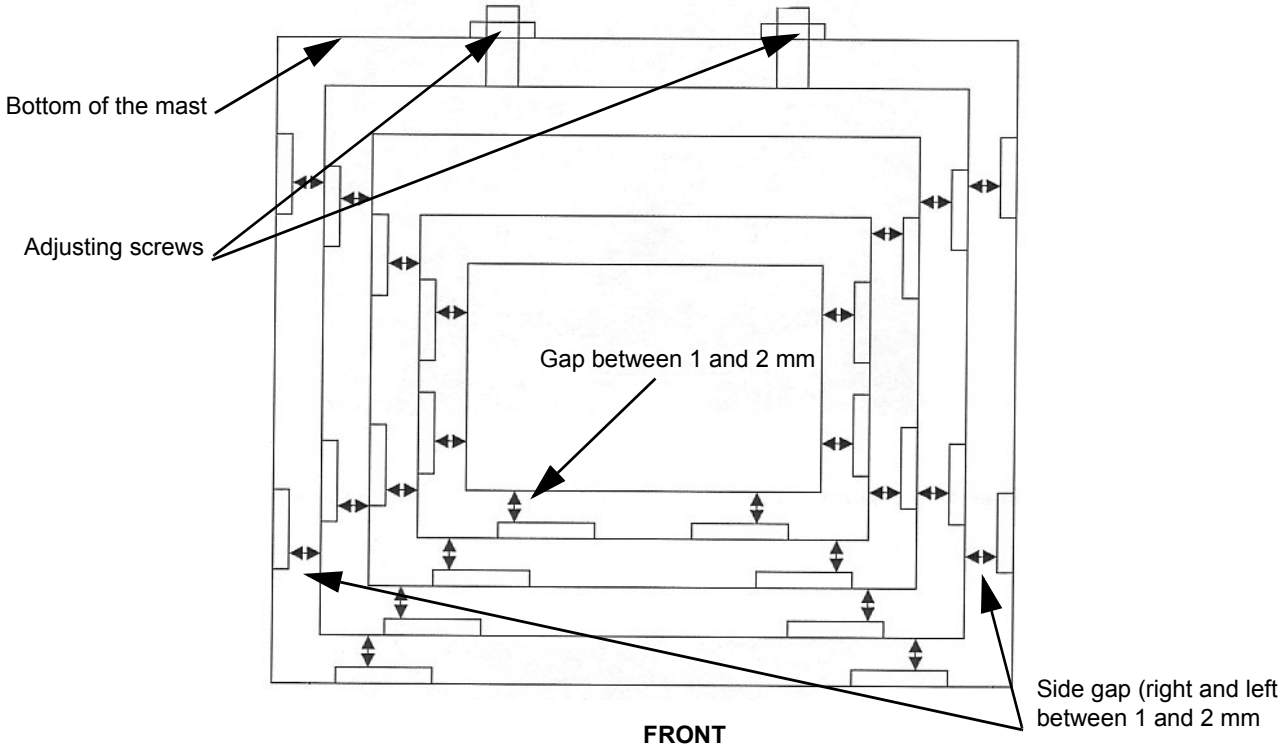
**4 - Adjustment of pads after assembling the mast**

- Raise the mast to the start of the 3rd caisson.
- Check the gap between the 4th and 3rd caissons (between 1 and 2 mm) using thickness wedges on the front side and right and left sides of the mast.

Photo 11




**REAR**

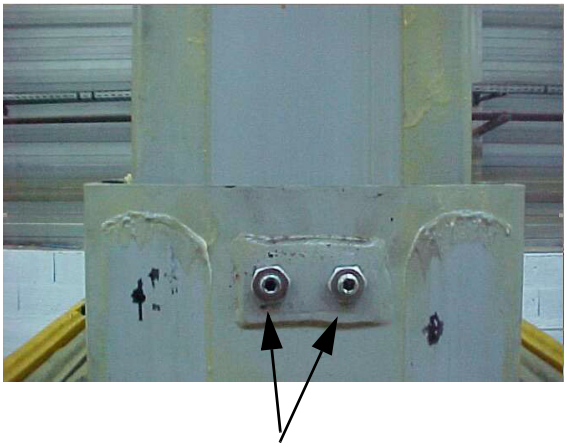



**FRONT**

- If necessary, adjust this gap using the two adjusting screws on the side.

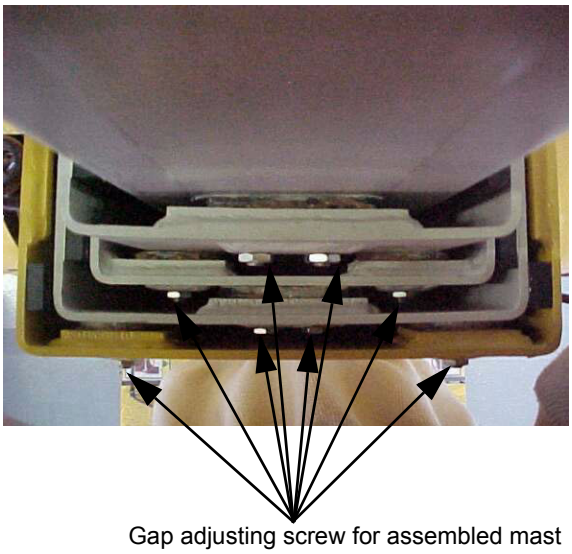
*NB: Repeat this operation between the 3rd and 2nd caisson, between the 2nd and 1st caisson and finally between the 1st caisson and the bottom of the mast.*

*NB: If the side gap is less than 1 mm, there must be a blockage. The mast must be dismantled and reassembled.*



Adjusting screws

Photo 12



Gap adjusting screw for assembled mast

Photo 13

**5 - Additional operations**

- Reinstall the cable sleeve support (see relevant sheet).
- Reinstall the counterweight (see relevant sheet).
- Reinstall the rotation motor (see relevant sheet).
- Reinstall the hydraulic block assembly (see relevant sheet).
- Reinstall the hydraulic tank (see relevant sheet).
- Reinstall the pump (see relevant sheet).
- Reinstall the hydraulic filter (see relevant sheet).
- Reinstall the hydraulic plate (see relevant sheet).
- Reinstall the electric plate (see relevant sheet).
- Reinstall the end of travel contactor SQ10 (see relevant sheet).
- Reinstall the charger (see relevant sheet).
- Reinstall the circuit breaker (see relevant sheet).
- Reinstall the jib (see relevant sheet).
- Reinstall the end of travel contactor SQ12 (see relevant sheet).
- Reinstall the hydraulic supply hose at the top of the mast.
- Reinstall the hydraulic winder (see relevant sheet)
- Reinstall the end of travel contactors SQ3 and SQ4 and the sheet covering them (see relevant sheet).
- Reconnect pump supply.
- Reinstall and reconnect the batteries (see relevant sheets).
- Reinstall the bottom right and left covers (see relevant sheet).
- Reinstall the motor cover (see relevant sheet).
- Reinstall the right and left side covers (see relevant sheet).
- Put the machine back into the operational configuration.
- Make several movements to check correct machine operation (and safety systems).

| Sheet C200 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING AN END OF TRAVEL CONTACTOR | |

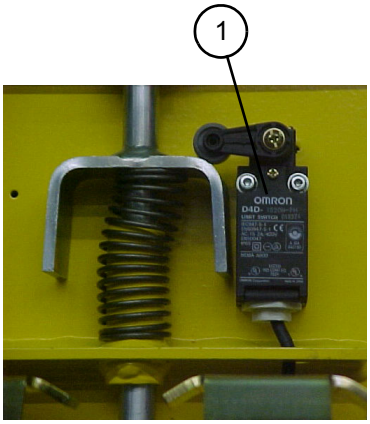
***Caution!***
***Do not use the machine during maintenance operations.***

**1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

**2 - Removing an end of travel contactor**

- Mark the position of the end of travel contactor (1).
- Remove the end of travel contactor.
- Open the end of travel contactor, mark and disconnect the electric connections.

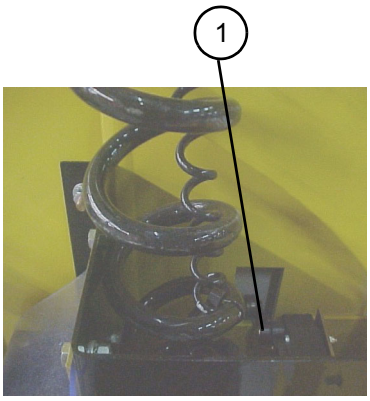



**3 - Reinstalling an end of travel contactor**

- Open the new end of travel contactor, reconnect the electric connections and close the contactor again.
- Put the end of travel contactor into place according to the position marked during dismantling and fix onto its support.
- Do not tighten the bolts before adjusting.

**4 - Adjustment and test**

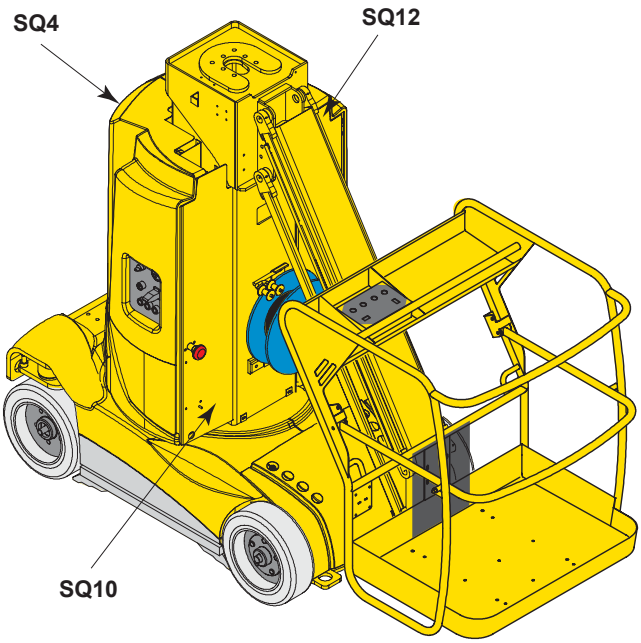
- Put the machine back into the operational configuration.
- Make the movement using the contactor in question and check that it works properly.
- Adjust the position of the contactor if necessary and tighten the fixing bolts.




SQ4 = mast down

SQ10 = high position caisson

SQ12 = jib up



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| | CORRECTIVE MAINTENANCE SHEET | |
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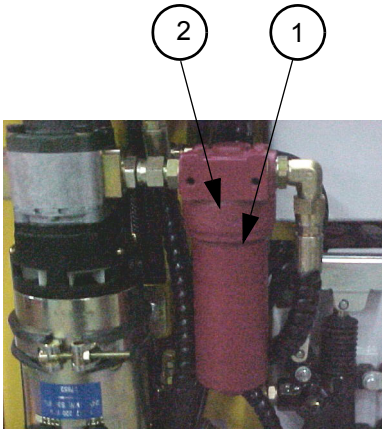
| Sheet C201 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING THE HYDRAULIC FILTER | |

***Attention !***
***Ensure that the oil is not too hot.***

***Attention !***
***Use a container to collect the oil to prevent pollution of the environment.***




**1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

**2 - Removing the hydraulic filter**

- Unscrew the bowl (1) of the hydraulic filter.
- Place a bowl under the hydraulic filter to collect the oil.
- Take the filtration element out of the base.

**3 - Reinstalling the hydraulic filter**

- Clean the filtration element support.
- Replace the filter.
- Screw the base back onto the fixed part of the hydraulic filter (2).
- Put the machine back into the operational configuration.
- Make several lifting cycles to purge the hydraulic circuit.

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|---|---|---|
| | CORRECTIVE MAINTENANCE SHEET | |
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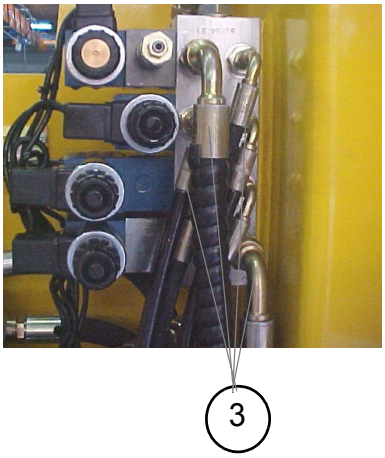
| Sheet C202 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING A HYDRAULIC BLOCK | |

***Caution!***
***Ensure that the oil is not too hot.***




**1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

**2 - Removing the hydraulic block**

- Open the covers to access the components.
- Mark and disconnect the electrovalves (2) of the hydraulic block (1).
- Mark and disconnect the hoses (3) of the hydraulic block.

*NB:* *Unscrew the hoses slowly to release residual hydraulic pressure.*

- Put caps on the hoses.
- Remove the union connectors from the hydraulic block.
- Remove the hydraulic block by removing the fixing screws and washers.

**3 - Reinstalling the hydraulic block**

- Put the hydraulic block into place and fix with screws equipped with new toothed washers.
- Put back the union connectors.
- Reconnect the hydraulic hoses according to the marks made during dismantling.
- Reconnect the electrovalves of the hydraulic block according to the marks made during dismantling.
- Put the machine back into the operational configuration.
- Make several movement cycles using the hydraulic block in question to purge the hydraulic circuit.
- Check the level in the hydraulic oil tank (see relevant sheet).
- Close the covers again

*NB:* *Check the chopper software version when changing the block: up to version 1.03 for blocks with two pressure limiters, from version 1.05 for blocks with three pressure limiters. For US machines, version from 1.04 US.*

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| | CORRECTIVE MAINTENANCE SHEET | |
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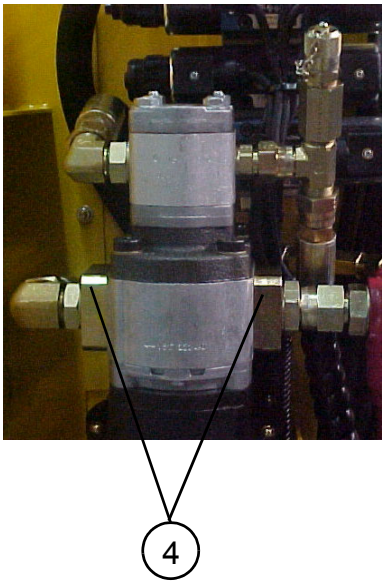
| Sheet C203 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING THE MOTORPUMP UNIT | |

***Caution!***
***Ensure that the oil is not too hot.***

***Caution!***
***Use a container to collect the oil to prevent pollution of the environment.***

***Caution!***
***It is essential to put the component into slings before dismantling/reassembling it.***




**1 - Preliminary operations**

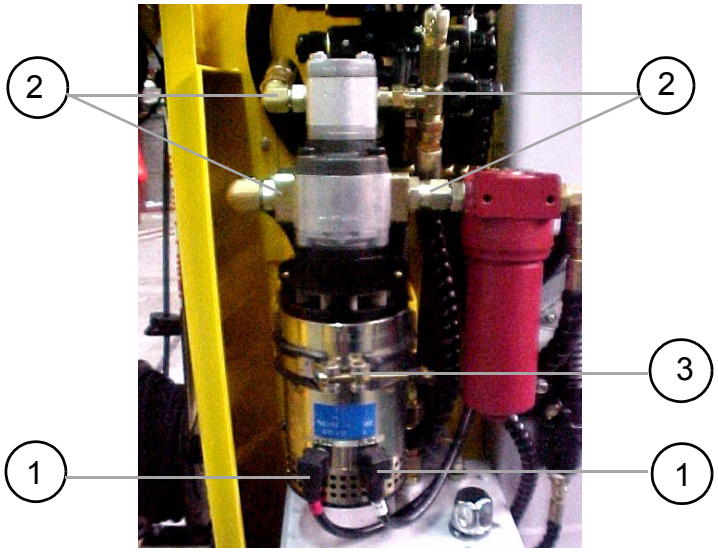
- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

**2 - Removing the motorpump unit**

- Mark and disconnect the electric connections of the motor pump unit (1).
- Mark and disconnect the four hoses (2) of the hydraulic pumps.
- Put caps on the hoses.
- Remove the fixing collar (3) of the motorpump unit and remove the unit.
- Remove the suction and discharge flanges (4) of the large pump.

**3 - Reinstalling the motorpump unit**

- Reinstall the suction and discharge flanges (4) equipped with new seals on the motorpump unit.
- Put the motorpump unit into place and secure with the fixing collar (3).
- Reconnect the hydraulic hoses (2) on the pumps according to the marks made during dismantling.
- Reconnect the electric connections (1) on the motor according to the marks made during dismantling.
- Put the machine back into the operational configuration.
- Check motor rotation direction.
- Make several lifting cycles to purge the hydraulic circuit.
- Check the level of the hydraulic oil tank.



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| | CORRECTIVE MAINTENANCE SHEET | |
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| Sheet C204 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING THE HYDRAULIC PUMP | |

***Caution!***
***Ensure that the oil is not too hot.***

***Caution!***
***Use a container to collect the oil.***

***Caution!***
***It is essential to put the component into slings before dismantling and reassembling it.***

**1 - Preliminary operations**

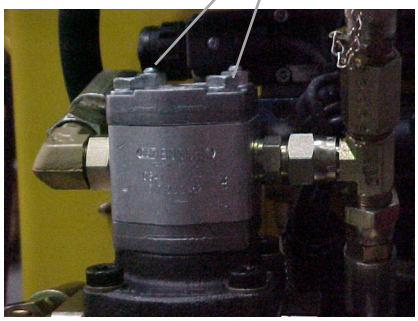
- Put the machine into maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

**2 - Removing the hydraulic pump**

- Remove the motorpump unit (see relevant sheet).
- Remove the screws fixing the pumps (2) to the motor and remove the pumps (1).

**3 - Reinstalling the hydraulic pump**

- Put new pumps, equipped with new seals, into place on the electric motor and secure with fixing screws.
- Put back the motorpump unit (see relevant sheet).
- Put the machine back into the operational configuration.
- Make several lifting cycles to purge the hydraulic circuit.
- Check the level of the hydraulic oil tank.



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| | CORRECTIVE MAINTENANCE SHEET | |
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| Sheet C205 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING THE ROTATION MOTOR | |

***Caution!***
***Ensure that the oil is not too hot.***

**1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).
- Close the shut-off valve, or empty the hydraulic tank.

**2 - Removing the rotation motor**

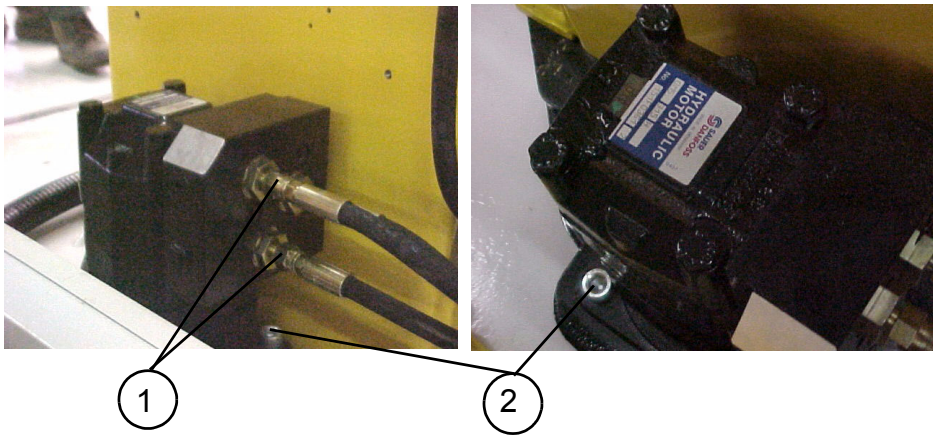
- Mark and disconnect the hoses (1) of the rotation motor.
- Put a cap on the hose.
- Unscrew the four fixing screws (2) of the rotation motor.
- Remove the rotation motor.

***Caution!***
***Use a container to collect the oil to prevent pollution of the environment.***

**3 - Reinstalling the rotation motor**

- Put a new motor, filled with oil, into place.
- Reinstall the screws with loctite.
- Reconnect the hydraulic hoses equipped with new seals.
- Put the machine back into the operational configuration.
- Make several operating cycles to purge the hydraulic circuit.
- Check the level of the hydraulic oil tank.

***Caution!***
***It is essential to put the component into slings before dismantling / reassembling it.***



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| | CORRECTIVE MAINTENANCE SHEET | |
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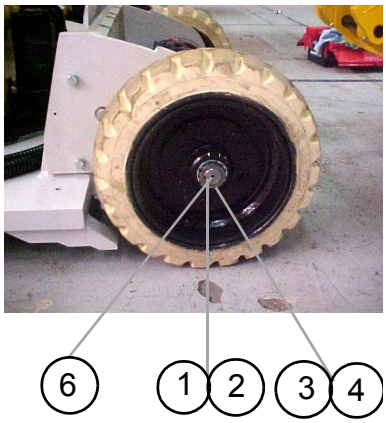
| Sheet C206 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING A DRIVE WHEEL | |



**1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).
- Raise the machine with a jack or hoist.

**2- Removing a drive wheel**

- Push back the tab (1) of the toothed washer (2).
- Unscrew the wheel's fixing nut (3).
- Remove the toothed washer (2) then the flat washer (4).
- Remove the wheel.

**3- Reinstalling a drive wheel**

- Replace the key (5) if necessary.
- Put a new wheel into place and secure with the fixing nut (6).
- After tightening, block the nut with the KM washer.
- Put the machine back into the operational configuration.

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| | CORRECTIVE MAINTENANCE SHEET | |
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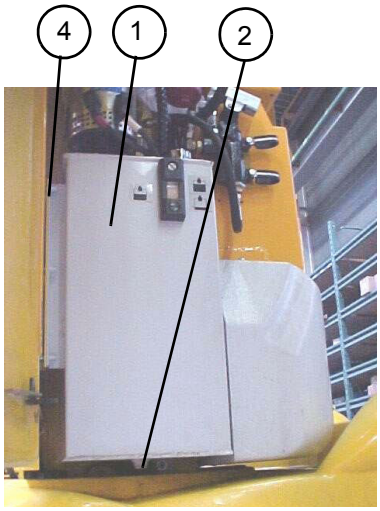
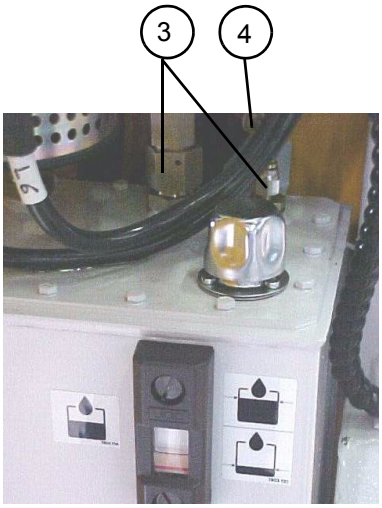
| Sheet C207 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING THE HYDRAULIC TANK | |

***Caution!***
***Ensure that the oil is not too hot.***

***Caution!***
***Use a container to collect the oil to prevent pollution of the environment.***




**1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

**2 - Removing the hydraulic tank (1)**

- Empty the tank by removing the plug (2).
- Disconnect the hydraulic hoses (3) and remove the hydraulic connectors.
- Put caps on the hoses.
- Remove the tank (1) by removing its fixing nuts (4).

**3 - Reinstalling the hydraulic tank**

- Reinstall the tank and secure with its nuts.

*NB:* *Take care with hydraulic hoses passing behind the tank.*

- Put the connectors back into place and connect the hoses (see table of tightening torque values).
- Fill the hydraulic oil tank (use the oil recommended by Pinguely-Haulotte).
- Put the machine back into the operational configuration.
- Make several lifting cycles to purge the hydraulic circuit.
- Check the level of the hydraulic circuit.

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| | CORRECTIVE MAINTENANCE SHEET | |
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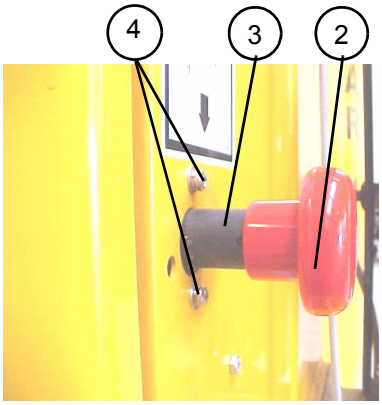
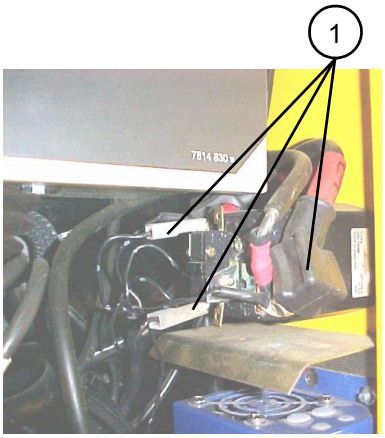
| SHEET C208 | CORRECTIVE MAINTENANCE SHEET | Sheet1/1 |
|---|---|---|
| | REPLACING THE TURNTABLE EMERGENCY STOP BUTTON | |

***Caution!***
***Do not use the machine during maintenance operations.***




**1 - Preliminary operations**

- Put the machine into the maintenance configuraiton (see relevant section).
- Switch off the electric power supply (see relevant section).
- Disconnect the “-” then “+” terminals of the batteries to isolate the electric circuit.

**2 - Removing the emergency stop button**

- Mark and disconnect the electric connections (1) of the emergency stop button.
- Remove the head of the emergency stop button (2) by unscrewing it, having blocked its pin by inserting a rod into the hole (3) provided.
- Remove the emergency stop button by unscrewing its two fixing screws (4).

**3 - Reinstalling the emergency stop button**

- Put a new emergency stop button into place.
- Reconnect the electric connections according to the marks made during dismantling.

**4 - Test**

- Reconnect the “+” then “-” terminals of the batteries.
- Put the machine back into the operational configuration.
- Check that the emergency stop button works properly.

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| | CORRECTIVE MAINTENANCE SHEET | |
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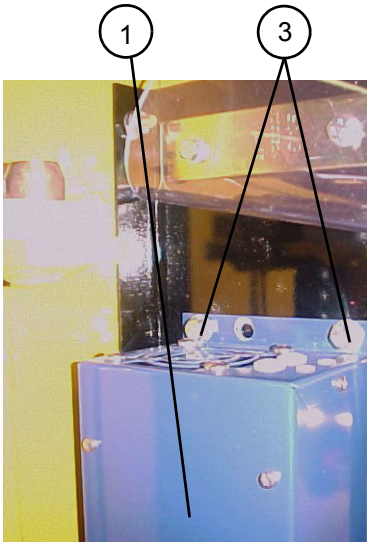
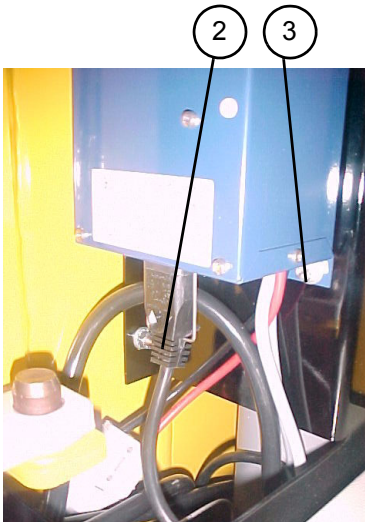
| Sheet C209 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING THE BATTERY CHARGER | |

***Caution!***
***Battery servicing operations require safety precautions (wear gloves and protective goggles).***




**1 - Preliminary operations**
- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

**2 - Removing the charger (1)**
- Mark and disconnect the electric connections (2).
- Remove the charger by removing its fixing screws and nuts (3).

**3 - Reinstalling the charger (1)**
- Perform the dismantling operations in reverse order to reassemble.

**4 - Additional operations**
- Put the machine back into the operational configuration.

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| | CORRECTIVE MAINTENANCE SHEET | |
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| Sheet C210 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/4 |
|---|---|---|
| | REPLACING THE SLEW RING | |

***Caution!***
***It is essential to put the component into slings before dismantling / reassembling it.***

***Caution!***
***Ensure that the lifting means are in good condition and of sufficient capacity.***

***Caution!***
***Ensure that the oil is not too hot.***

***Caution!***
***Use a container to collect the oil to prevent pollution of the environment.***

Photo 1

Photo 2

**1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).
- Disconnect and remove the batteries (see relevant sheet).
- Remove the covers (see relevant sheet).
- Remove the hand pump (see relevant sheet).
- Remove the end of travel contactors (see relevant sheet).
- Remove the hydraulic winder (see relevant sheet).
- Remove the hydraulic supply hose from the top of the mast.
- Remove the jib plus basket assembly (see relevant sheet).
- Remove the circuit breaker (see relevant sheet).
- Remove the charger (see relevant sheet).
- Remove the electric plate (see relevant sheet).
- Remove the hydraulic filter (see relevant sheet).
- Remove the pump (see relevant sheet).
- Remove the hydraulic tank (see relevant sheet).
- Remove the hydraulic unit (see relevant sheet).
- Remove the rotation motor (see relevant sheet).
- Remove the counterweights (see relevant sheet).
- Remove the cable sleeve support (see relevant sheet).
- Remove the mast (see sheet 198) and place on trestles (Photo 1).

*NB:* *Unscrew the hydraulic hoses slowly to release residual pressure.*

*NB:* *Put caps on the hoses.*

*NB:* *Only use greases and lubricants recommended by the manufacturer (see relevant section).*

**2- Removing the slew ring**

- Unscrew the 12 screws fixing the ring to the mast (Photo 2).
- Separate the ring assembly from the main mast caisson.

**3- Reinstalling a new slew ring**

- Screw the slew ring onto its support using new screws (class 8.8 - HM14x65/34) and loctite to a torque of 99 ft.lb /135Nm (photo 3 ref 1).

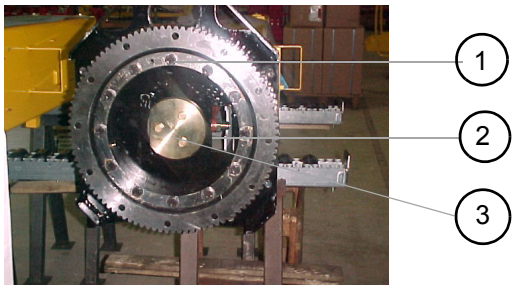


Photo 3

- Grease generously (Photo 3 ref 2).
- Put the assembled slew ring and its support into slings.
- Position the assembly opposite the mast cylinder.
- Screw the fixing plate to the centre of the slew ring (Photo 3 ref. 3)
- Make sure there is no grease on the threads.
- Re-secure the support-ring assembly to the mast with 12 screws (class 8.8 - HM16x100/38) and loctite (Photo 2).

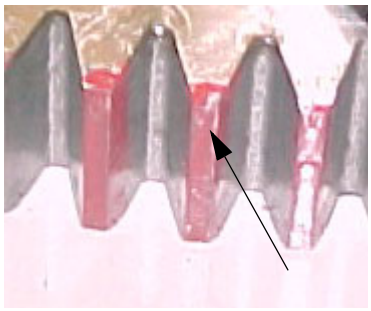

Photo 4

***Caution!***
***Before reassembling the mast rotation motor, check that the cable sleeve is free to move around the whole rotation.***

***Caution!***
***If safety parts are replaced, they must be validated with static tests.***
***CE = 1.25 x nominal***
***USA= 1.5 x nominal***

*NB: Start by putting in the screws on one side and adjust the mast position with the sling to adjust the position of the ring assembly.*

- Tighten to a torque of 143 lbf.ft / 195Nm for the ring-mast fixture and 99 ft.lb /135Nm for the ring-support fixture using a torque wrench.
- Turn the ring to the Trempe point marked by a red spot on the ring. (Photo 4).
- Put the mast into slings (2 m slings) to put it in the vertical position. (Photo 5).

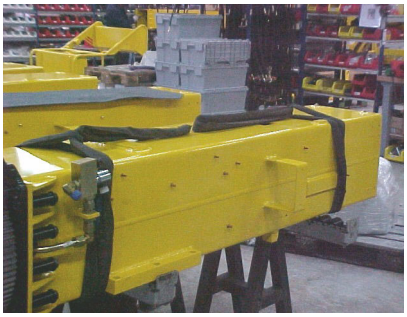

Photo 5

- Prepare planks where the mast will be placed to protect the slew ring.
- Position the mast in the vertical position.

*NB: Move the whole assembly forwards by lifting the mast with the hoist control.*

- Position the mast using the guides fixed on the chassis (Photo 6) so that the trempe point (Photo 4) is as close as possible to the mechanical stop of the chassis.

Photo 6

- Tighten the screws in diagonally opposite pairs.
- Prepare the screws to fix the ring to the chassis and apply loctite, checking that the thread is clean and totally grease-free.
- Insert two pins in two diagonally opposite screws threads of the chassis.
- Tighten the screws one by one, turning th mast from right to left.
- Replace the pins with screws to fix to the ring to the chassis (Photo 7, ref.1).

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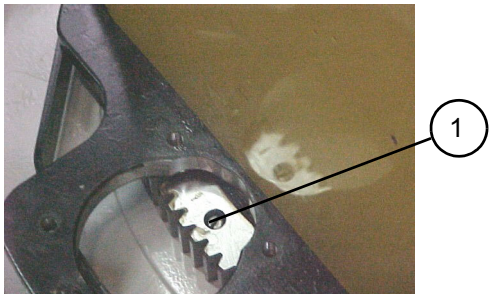


Photo 7

*NB:* *Tighten to a torque of 99 lbf.ft /135Nm. Tighten the screws in diagonally opposite pairs.*

- Check that the mast turns properly from stop to stop.

**4- Additional operations**

- Remove the slings.
- Check that the counterweights are properly secured to the machine.
- Put the machine back into the operational configuration.
- Make several rotation movements to test correct operation of the slew ring and to purge the hydraulic circuit.
- Check the level of the hydraulic tank.

***Caution!***
***After reinstalling the mast, it is essential to have static and dynamic load tests performed by a certified organisation.***

| | | |
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| Sheet C210 | CORRECTIVE MAINTENANCE SHEET | Sheet 4/4 |
| | REPLACING THE SLEW RING | |

| Sheet C211 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/2 |
|---|---|---|
| | REPLACING A STEERING PIVOT | |

***Attention !***
***Ensure that the oil is not too hot.***

***Attention !***
***Use a container to collect the oil to prevent pollution of the environment.***

***Attention !***
***It is essential to put the component into slings before dismantling / reassembling it.***

***Attention !***
***Check that the lifting means are in good condition and of sufficient capacity.***

**1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Disonnect the batteries
- Switch off the electric power supply (see relevant section).
- Remove the chassis covers (see relevant sheet).
- Remove the wheel in question (see relevant sheet).
- Lift the chassis with a jack or hoist.

**2 - Removing a steering pivot**

- Remove the pin and washer (Photo 1).
- Unscrew the steering pivot fixing plates (Photo 2).

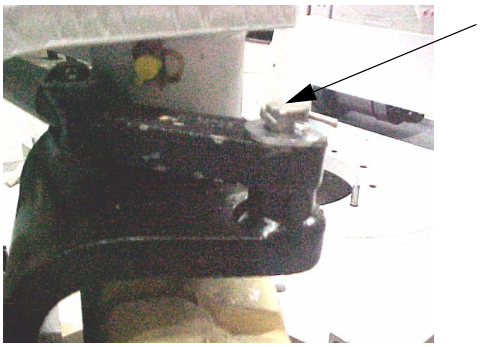


Photo 1

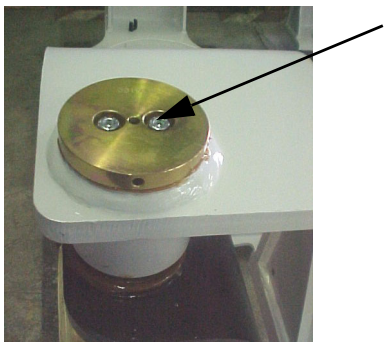


Photo 2

- Lift the chassis. The pivot comes down.
- Hit the pin near the stud on the pivot with a mallet.
- Remove the pivot

**3- Reinstalling a steering pivot**

- Grease the steering pivot.
- Grease the hub (1).

*NB:* *Grease the parts added evenly and insert them using a mallet.*

- Place the bearing in the hub (2).
- Push in completely (1).
- Insert a seal (5).
- Push in completely.
- Position the hub after turning it on the pivot (Photo 5).

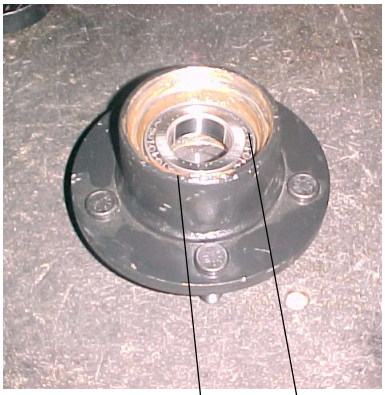



Photo 3

Photo 4

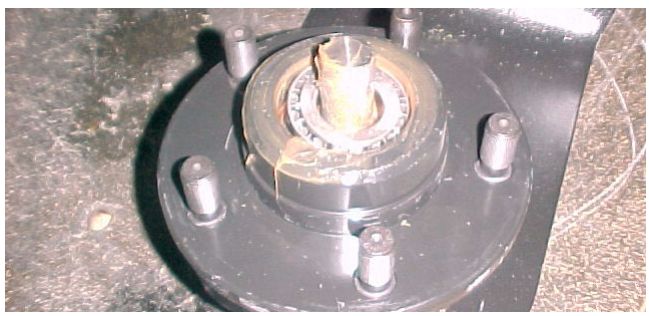


Photo 5

- Lower the pivot.
- Install the conical roller bearing (6).
- Lower it.
- Install a flat washer (8) on the bearing (Photo 6).

- Place the wheel on the pivot.
- Screw the fixing nuts (12) without tightening them too far to avoid blocking the bearings.
- Fix the stud (9) on the nut (10) (Photo 6).

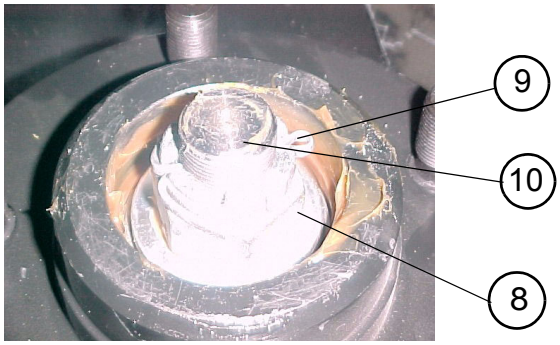



Photo 6

Photo 7

- Put the cap on the wheel and secure (11) (Photo 7)
- Grease generously.

*NB: The brake washer must be changed whenever the wheel is replaced.*

**4- Additional operations**

- Remove the slings.
- Put the machine back into the operational configuration.
- Make several travel movements to purge the hydraulic circuit.
- Check the level of oil in the wheel reducer.
- Check the level of the hydraulic oil tank.

| Sheet C212 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING A STEERING CYLINDER | |

**1 - Preliminary operations**

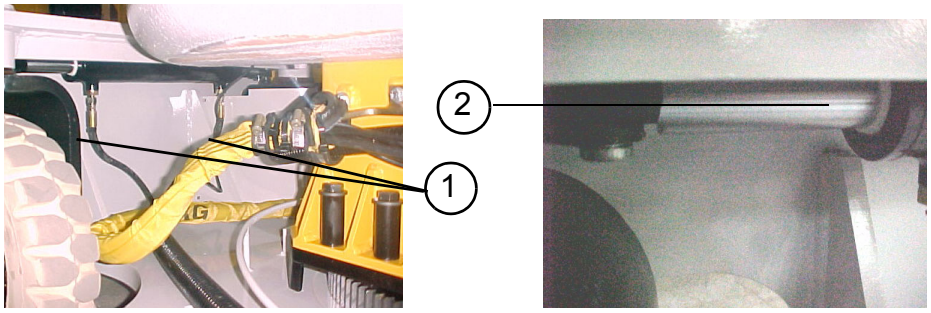
- Put the machine in the low configuration.
- Switch off the electric power supply (see relevant section).

**2 - Removing the steering cylinder**

***Caution!***
***Ensure that the oil is not too hot.***

- Mark and disconnect the two hoses of the steering cylinder (1).

*NB: Unscrew the hoses slowly to release residual hydraulic pressure.*



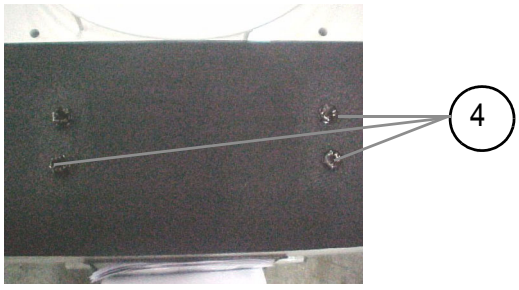

***Caution!***
***Use a container to collect the oil to prevent pollution of the environment.***

- Put caps on the hoses.
- Put the cylinder into slings.
- Unscrew the fixing screws of the steering cylinder (2).
- Remove the steering cylinder.

**3 - Reinstalling the steering cylinder**

- Put a new steering cylinder into place with the fixing screws (4).

***Caution!***
***It is essential to put the component into slings before dismantling/ reassembling it.***




- Reconnect the hydraulic hoses according to the marks made during dismantling (1).
- Put the machine back into the operational configuration.
- Make several steering movements to purge the hydraulic circuit.
- Check the level of the hydraulic oil tank

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| | CORRECTIVE MAINTENANCE SHEET | |
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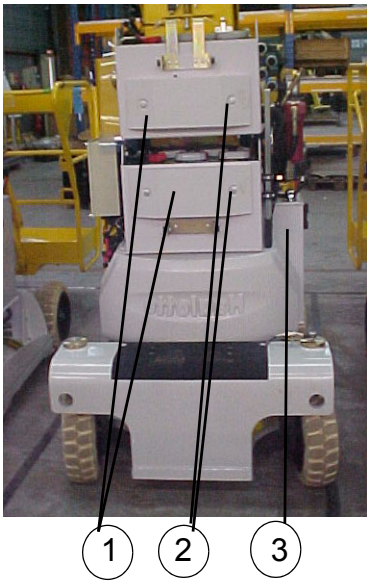
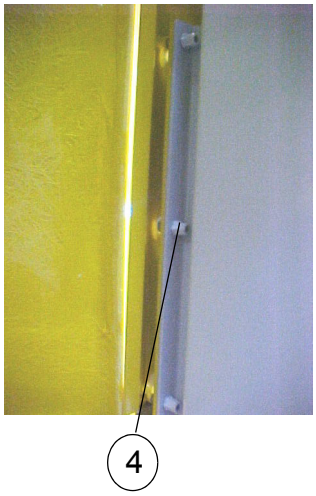
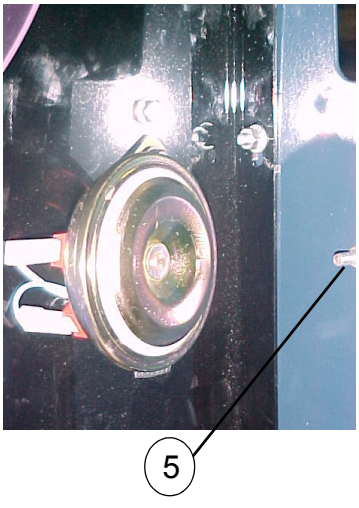
| Sheet C213 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING THE COUNTERWEIGHTS | |




**1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).

**2 - Removing the counterweights**

- Put the counterweights (1) fixed on the battery trays into slings.
- Unscrew their fixing screws (2).
- Remove the counterweights.
- Remove the bottom battery tray by unscrewing the fixing plates on either side of the tray (see relevant sheet).
- Slacken all the fixing screws (4) of the hydraulic tank (3).
- Unscrew the closing plate fixed to the electric plate to access the fixing screws at the back of the main counterweight.
- Put the main counterweight into slings.
- Unscrew the screws at the back of the 86 stone / 550 kg counterweight.
- Remove the counterweight.

**3 - Reinstalling the counterweights**

- Vacuum clean the holes drilled on the fixing plate of the main counterweight.
- Put each counterweight into slings.
- Tighten the screws and grower washers at the back of the main counterweight.
- Screw the closing plate for the electric part back onto the electric plate.
- Position the 68 lb / 31kg counterweight opposite each battery tray.
- Insert the battery tray pilot points into the counterbores.
- Fix the counterweights with the fixing screws.

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| | CORRECTIVE MAINTENANCE SHEET | |
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| Sheet C214 | CORRECTIVE MAINTENANCE SHEET<br>REPLACING THE ELECTRIC PLATE | Sheet 1/2 |
|---|---|---|

***Caution!***
***Ensure that the oil is not too hot.***

***Caution!***
***Use a container to collect the oil to prevent pollution of the environment.***

***Caution!***
***It is essential to put the component into slings before dismantling / reassembling it.***

***Caution!***
***Make sure that the lifting means are in good condition and of sufficient capacity.***

**1 - 1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Disconnect the battery terminals, top and bottom trays.
- Switch off the electric power supply (see relevant section).
- Disconnect the two hoses of the steering cylinder (see relevant sheet).
- Disconnect the plug of the steering potentiometer (see corresponding sheet).
- Disconnect the travel motor connections (see relevant sheet).
- Unscrew the cable clamp of the cables inside the sleeve (see relevant sheet).
- Unscrew the cable sleeve fixing cables (see relevant sheet).
- Disconnect the mast lowering electrovalve plug near the rotation motor (see relevant sheet).
- Mark the position of the cables on the electric onnections of the hydraulic distribution block.
- Unscrew the connections and remove the wires (see relevant sheet).
- Disconnect the electric connections of the pump (see relevant sheet).
- Disconnect the mast end of travel contactor (see relevant sheet).
- Disconnect the jib cylinder distribution block (see relevant sheet).
- Disconnect the jib end of travel contactor (see relevant sheet).
- Disconnect the top panel plug (see relevant sheet).
- Unscrew all the cable clamps on the platform.
- Unscrew the collars on the jib.
- Dismount the two bolts above the electric plate.
- Unscrew the spiral cable stop collar (Photo 7 ref.9).

**2 - - Removing the electric plate**

- Unscrew the two fixing screws of the push button (Photo 1 ref. 1) with a BTR key.

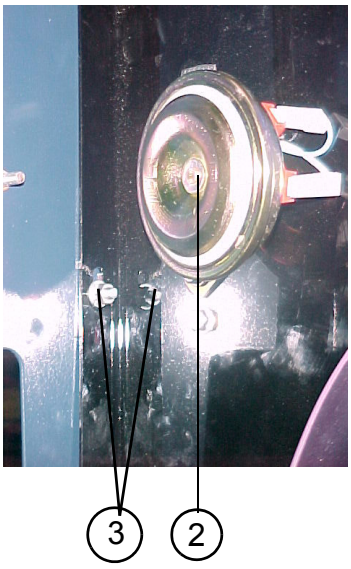


Photo 3

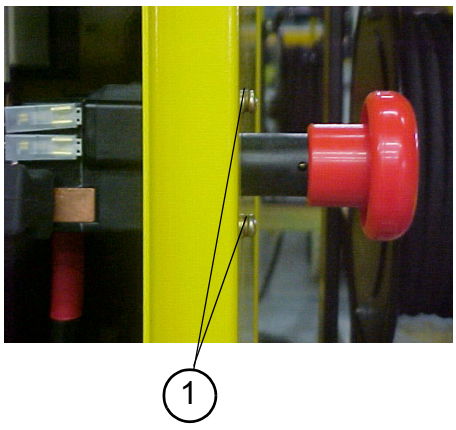


Photo 1

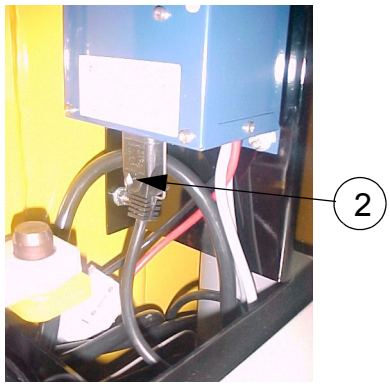


Photo 2

- Pull the wire of the charger's 220V plug (Photo 2 ref.2).
- Unscrew the horn screw (Photo 3 ref.2).
- Unscrew and remove the 4 nuts from the electric plate closing plate (Photo 3 ref.3).
- Unscrew the other screws on the edge of the electric plate (Photo 4).

| Sheet C214 | CORRECTIVE MAINTENANCE SHEET | Sheet 2/2 |
|---|---|---|
| | REPLACING THE ELECTRIC PLATE | |

Photo 6

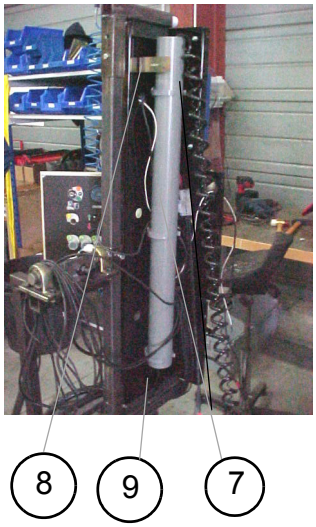



Photo 7

**3 - - Reinstalling the electric plate**

- Put back the electric plate, checking the cable routes via the plate.
- Fix the various elements (horn (1), chopper (2), battery charger (3), tilt sensor (4), fuse holder (5), turntable box (6), collar and polypropylene tube (7), mast end of travel contactor support (8) ) on the plate (Photo 5).
- Screw the stop collar of the spiral cable back into place (Photo 7 ref.9)
- Screw the electric plate at its various fixing points (Photo 6).

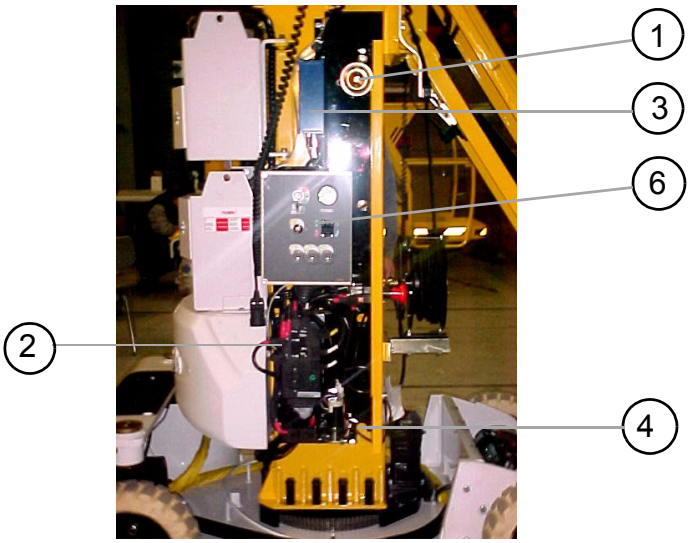



Photo 5

**4 - Additional operations**

- Reconnect the charger to the socket.
- Reconnect the hydraulic distribution block connections.
- Reconnect the battery terminals.
- Fix all the cables on the platform and jib.
- Tighten all the cable clamps of all cables in the sleeve.
- Tighten the cable sleeve with the fixing collars.
- Reconnect the top panel plug.
- Reconnect the travel motor cables.
- Reconnect the steering cylinder hoses.
- Reconnect the steering potentiometer plug.
- Reconnect the plug of the electrovalve near the rotation motor.
-

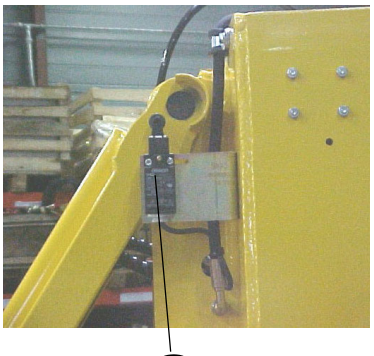
| Sheet C215 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/1 |
|---|---|---|
| | REPLACING THE JIB-PLATFORM ASSEMBLY | |

***Caution!***
***Ensure that the oil is not too hot.***

***Caution!***
***Use a container to collect the oil to prevent pollution of the environment.***

***Caution!***
***It is essential to put the component into slings before dismantling / reassembling it.***

***Caution!***
***Check that the lifting means are in good condition and of sufficient capacity.***

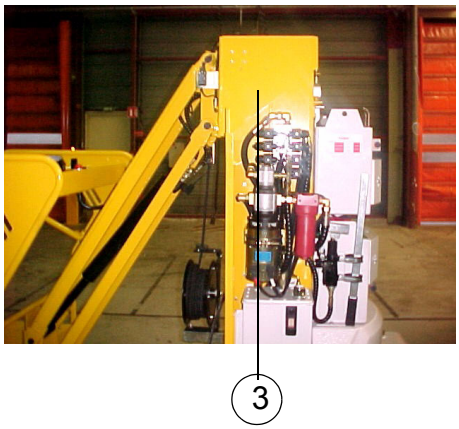


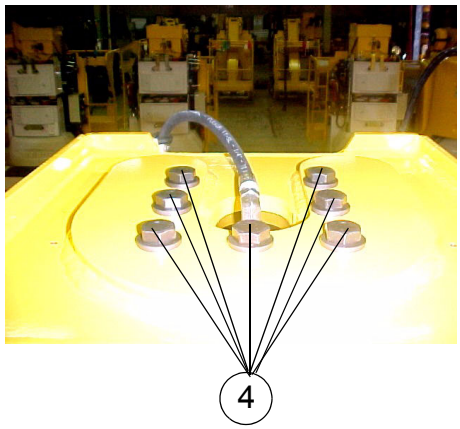
**1 - Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).
- Remove the jib end of travel contactor (ref. 1).
- Disconnect the hydraulic distributor (ref. 2) of the jib cylinder.
- Disconnect the hoses of the steering cylinder.
- Put caps on the hoses.

**2 - Removing the jib-platform assembly**

- Put the jib-platform assembly into slings.
- Unscrew the 7 screws (ref.3) of the top cover (ref.4) of the jib-platform assembly.

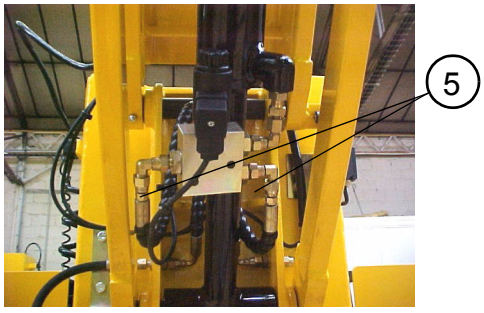



- Remove the assembly using a hoist.

**3 - Reinstalling the jib-platform assembly**

- Put the jib-platform assembly into slings
- Reinstall the assembly on the mast in order to secure the top cover (ref.4).
- Screw the 7 screws of the jib-platform top cover
- Reinstall the jib end of travel contactor.
- Reconnect the hydraulic distributor of the jib cylinder (ref. 2)
- Reconnect the hoses to the jib cylinder (ref. 5)




**4 - Additional operations**

- Put the machine back into the operational configuration.
- Make several jib lifting movements to purge the hydraulic circuit.
- Check the level of the hydraulic oil tank.

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| | CORRECTIVE MAINTENANCE SHEET | |
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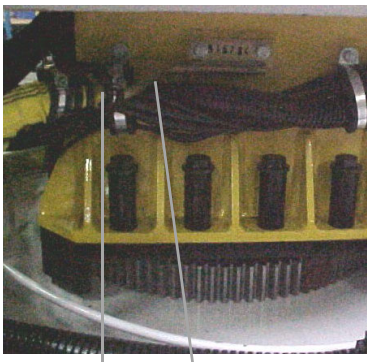
| Sheet C216 | CORRECTIVE MAINTENANCE SHEET | Sheet 1/2 |
|---|---|---|
| | REINSTALLING THE CABLE SLEEVE | |

***Caution!***
***Check that the cable sleeve is properly positioned and secured each time the machine's systems are removed.***




**1- Preliminary operations**

- Put the machine into the maintenance configuration (see relevant section).
- Switch off the electric power supply (see relevant section).
- Disconnect the two electric cables of the brake control.
- Disconnect the 6 cables of the electric motor.
- Disconnect the 2 hoses of the steering cylinder.
- Disconnect the steering potentiometer connectors.

**2 - Removing the cable sleeve**

- Unscrew the collars around the support (3), near the rotation motor (5) and the steering cylinder (6).
- Unscrew the rizlans (2) and the collar (4) fixing the cables to the cable sleeve support.
- Remove the cable sleeve from its support (3).
- Remove the cable sleeve.

**3- Installing the cable sleeve**

- The cables inserted into the cable sleeve include:
  - 2 hydraulic hoses on the second row from the top (1)
  - 2 brake cables.
  - 2 travel motor inducer circuits.
  - 2 travel motor induced circuits.
  - 3 steering potentiometer cables
- Tape the cables and tighten with a rizlan (2)
- Fix these cables on the cable sleeve support guide (3)
- Put the cable sleeve back around the cables and at the top of the support-guide.
- Fix the cable sleeve with a fixing collar:
  - near the rotation motor on the rod guide (5)
  - near the steering cylinder (6).

- Operate the machine to stretch the cable sleeve and check its escape limit.